NEWS! MOSQUITO TA122:
NEAR 50-YEAR RESTORATION COMPLETE

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DOUGLAS A-26B INVADER

MONARCH CONVERSION

Registration: **N167B**
Manufacturer: **Douglas**
Serial number: **44-34602**
Year: **1944**
Location: **Germany, EDTG**
Engine: **2x Pratt & Whitney R-2800-79**
Propeller: **2x 23E50-505**

This is a "Monarch-26" Conversion with Ring-Spar-Mod and 6x passenger seats in the back. It has full dual control and was one of the 1st Invaders converted as a Trainer in Burbanks, CA.

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more info

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After a restoration project spanning nearly half-a-century (this image is from 2021), the restoration of Mosquito FB.VI TA122 is now complete. See page 28 Phil Birtles

Ah! de Havilland...

The red holly berries provided a welcome splash of colour as I stepped out on an otherwise frosty morning walk. Despite the deepening winter, it is good to see that not all the locally based aeroplanes are hibernating in their hangars. I had the pleasure of the nearby resident Tiger Moth circling the village on a rare blue-sky morning and I will never tire of hearing the buzz of a Gipsy Major. It was a wonderful coincidence, considering *FlyPast* was about to feature the legendary de Havilland company.

Phil Birtles dedicates nine pages to the aircraft types that made the de Havilland name world famous: the DH.4 (the first de Havilland design to win major orders), the DH Moth series (considered the world's first affordable, practical and safe light aeroplane), plus the Tiger Moth (the mass-use wartime trainer that is still popular today), the Mosquito (revolutionary 'wooden wonder' that outperformed its contemporaries) and the Comet airliner (the world's first passenger jet). Phil also provides a detailed look behind the scenes at the recently completed restoration of the de Havilland Museum's Mosquito FB.VI fighter bomber, a project that spanned several decades before its official completion in October. And maintaining the de Havilland theme, we took the rare opportunity to photograph IWM Duxford's resident DH.9 at night.

This month's Classic aircraft is one of the most successful types in aviation history: the Douglas DC-3/C-47. The type made its first flight 90 years ago and many are still earning a living today. Malcolm V Lowe recounts the story of how a star was born as the entry point for 23 pages of 'Dakota' content.

For our anniversary feature, *FlyPast*'s Jamie Ewan recalls RAF Coastal Command's so-called 'Black Friday' when, with the war in Europe approaching its final stages, Bristol Beaufighter strike units suffered devasting combat losses against Luftwaffe fighters during a February 1945 anti-shipping strike. We also showcase a deadly combat story from a later generation – the first successful Mirage F.1 vs MiG-21 interception and the remarkable reconciliation between the former adversaries that followed.

Finally, for our museums feature, we hop across to France to see two essentially private collections. The first is a real treasure trove of rarely seen types that are usually hidden behind hangar doors at Melun-Villaroche airfield, while the other is Marc Bétrancourt's eclectic mix of aircraft in the Somme valley. Both are well worth obtaining permission to visit.

Until next time.

Editor

Tom Allett

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Douglas C-47A Skytrain N74589 'Placid Lassie' runs her engines at Duxford in May 2024. Our DC-3 coverage begins on page 42
AirTeamImages-Martin Stovey

Born in 1882, Geoffrey de Havilland became one of Britain's finest aircraft pioneers. He designed, built, and successfully flew his first, in September 1910. A pusher type retrospectively dubbed the de Havilland No.2, it was powered by a 45hp engine of his own design. He later sold it to the Royal Aircraft Factory (RAF) at Farnborough, Hampshire, where he was employed as a designer and test pilot, for the sum of £400 (approximately £59,000 today). It was renamed the Royal Aircraft Factory F.E.1.

Designing and flying several experimental types at the 'Factory', his B.E.2 two-seat observation machine, used widely during the early stages of World War One, appeared in early 1912. On September 2, he was commissioned as a second lieutenant (on probation) in the Royal Flying Corps. Appointed a reserve officer that November, his rank was confirmed on December 25.

De Havilland's role with the RAF changed in January 1914. With a dedicated team of designers and engineers, and more pilots employed, he was moved to the Aeronautical Inspection Department as Inspector of Aeroplanes. Working under Major John Fulton (one of Britain's earliest military aviators), de Havilland was tasked with examining and flying new aircraft types to ensure safety and suitability. But the job was not to his liking – he wanted to design aeroplanes.

Back to the drawing board

In May 1914, de Havilland, then 31 years old, was seconded to the Aircraft Manufacturing Company Limited (Airco) at Hendon, north London, as chief designer and test pilot. It was there he started his de Havilland aircraft design series – starting with his two-seat DH.1 scout pusher biplane.

What followed was a diverse range of types that included twin-engine bombers, fighters, and trainers. The most significant was the single engine two-seat DH.4 bomber powered by a 250hp Rolls-Royce Eagle, which de Havilland first flew in August 1916.

Construction was the era traditional wire-braced wooden structure covered with fabric, with two open cockpits separated by the main fuel tank. The standard armament was a forward-firing synchronised 0.303 (7.7mm) Vickers machine gun for the pilot mounted atop the fuselage and either a single, or twin, Lewis gun of the same calibre mounted on a Scarff ring operated by the gunner/observer. Its typical warload comprised either 4 x 112lb or 2 x 230lb bombs.

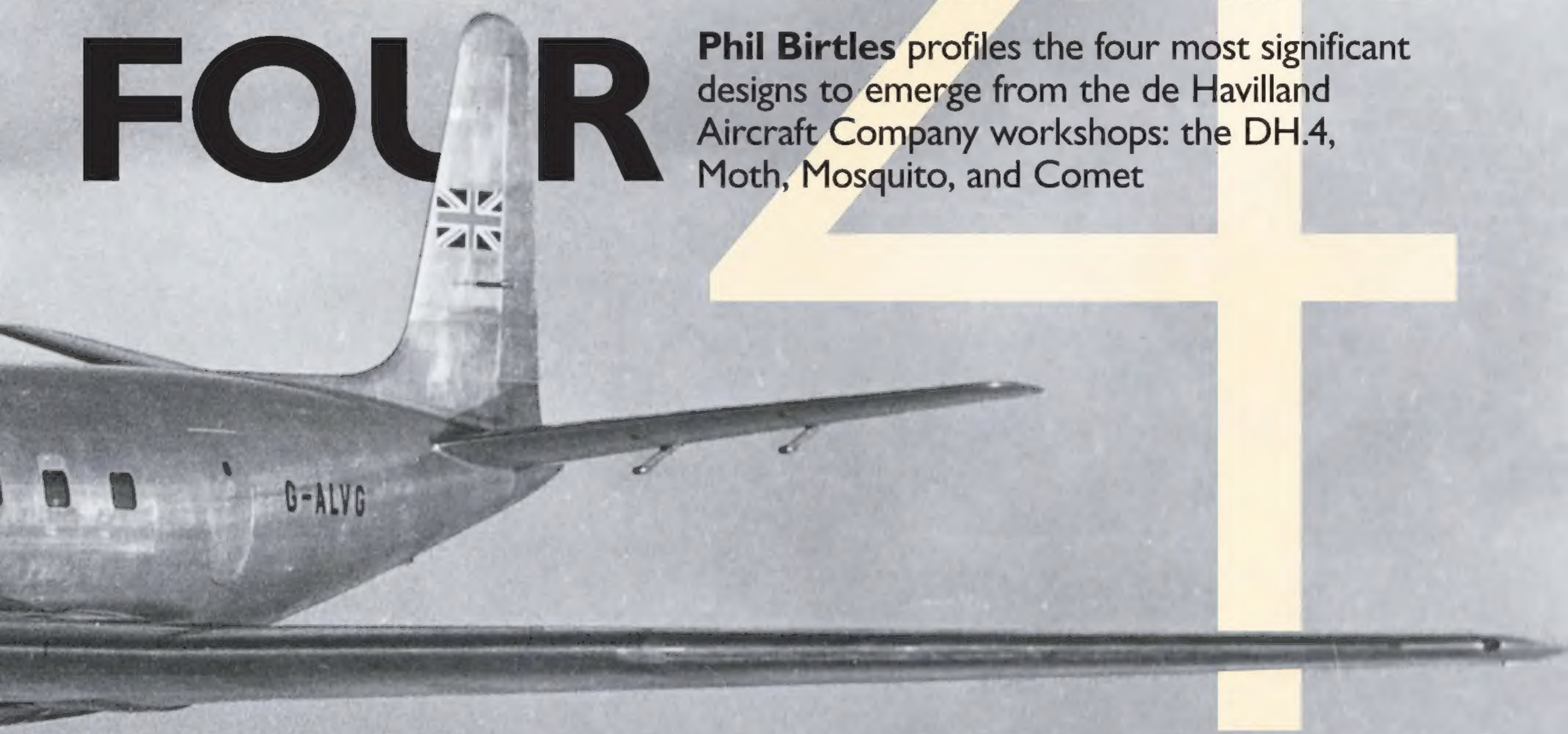
To avoid delays in production, an order was placed for 50 aircraft before the prototype had flown. This confidence was rewarded with a flight test report observing good stability in flight, light flying controls, and relatively comfortable crew positions. Entering service with 55 Squadron RFC in France on March 6, 1917, production was increased following German raids on London that June – orders being placed with Westland. The DH.4's excellent performance made it better than its contemporaries being able to escape enemy machines using its superior rate of climb and speed.

Numerous RFC squadrons were eventually equipped with DH.4s powered by a variety of engines. The most successful powerplant was Rolls-Royce's 375hp Eagle VIII, which gave the type a maximum speed of 133.5mph at 10,000ft. In October 1917, 55 Squadron was transferred to No 41 Wing to carry out daylight bombing missions in Germany – the first on the 17th of that month with a raid on Saarbrücken. This wing morphed into the Independent Air Force on June 6, 1918, and continued its strategic bombing campaign through to the Armistice on November 11 that year.

For home and coastal defence, the Royal Naval Air Service was equipped with Westland-built DH.4s from the spring of 1917. Among their successes was shooting down Zeppelin LZ.112 L 70 on August 5, 1918 (during what turned out to be the last airship raid of the war) and the sinking of the German Imperial Navy submarine UB 12 just six days later. But with the war's end, the DH.4 was quickly withdrawn

THE FAMOUS FOUR

Phil Birtles profiles the four most significant designs to emerge from the de Havilland Aircraft Company workshops: the DH.4, Moth, Mosquito, and Comet



from active service.

Notably, the DH.4 boasts the rare distinction of being a British aircraft adopted by the United States. On April 6, 1917, when the US declared war on Germany it didn't have a single combat aircraft in service. It quickly selected the DH.4 powered by the American 435hp V-12 Liberty engine – although more than 1,000 modifications to the original design were needed.

Production was allocated to three automobile manufacturers, including the Fisher Body Corporation in Detroit, Michigan, which had considerable difficulty adapting their lines to fabric covered wooden aircraft. While a total of 12,348 DH-4s were ordered, only 4,846 were built – of which less than 200 reached the front lines before the end of hostilities. And although the first aircraft arrived unassembled in France on May 11, 1918, and flew six days later, the type's first mission didn't occur until August 2 due to lack of combat readiness.

The main US development was the DH-4B, which included the fuselage being covered with stressed plywood, and the forward cockpit being moved back, exchanging places with a larger fuel tank. This improved crew communications, range, and pilot safety in the event of a crash. A more radical conversion came from Boeing which developed the DH-4M with an arc-welded steel tube fuselage. This provided Boeing with valuable experience in metal structures when developing its first fighters.

Many of the surplus US aircraft were modified for a variety of duties – including as air ambulances and sky writers. The most interesting conversions were those for the pioneer US Mail service which began operations on May 15, 1918. Flying huge distances in all weathers and around the clock, the mail was carried in the front cockpit, while the pilot flew from the rear. Operations using DH-4s continued until 1931.

In Britain several surplus DH.4s were converted for cross-Channel communications duties. Designated DH.4As, the main modification was the fitting of a two-seat cabin where the rear cockpit was. Four airframes were prepared and assigned to 2 (Communications) Squadron based at RAF Kenley, Sussex, during 1919. Regularly flying between the UK, Paris and Brussels in preparation for the negotiations and signing of the Peace Treaty on June 28 that year, the squadron disbanded in September and its aircraft were bought by Handley Page Transport for its traditional wire-braced wooden structure then embryonic airline operation. Another four examples were converted by Airco and for the de Havilland operated Aircraft Transport & Travel. On August 25, 1919, it commenced daily services between London's Hounslow Heath Aerodrome and Le Bourget, Paris – the world's

Above
The instantly recognisable lines of de Havilland's groundbreaking Comet prototype soaring through the skies as it pushed the boundaries of aviation in 1949…
KEY Collection

Right
On August 12, 1912, Geoffrey de Havilland flew this BE.2 to a record height of 10,560ft. Seen here in the rear seat, his passenger was Maj Frederick Sykes, the then Officer Commanding Military Wing of the Royal Flying Corps
All images BAE Systems unless stated otherwise

first regular international service. Six weeks later, on November 12, it flew the inaugural British airmail flight between RAF Hawking in Kent and the German city of Cologne. With Instone Air Line winning the 1922 King's Cup Air Race with DH.4A G-EAMU, the type also became a pioneering local service airliner and racer.

Power play

Following World War One, the anticipated boom in aviation failed to materialise – forcing many manufacturers out of business, or to massively downsize. Airco, then the world's largest aircraft enterprise, sold its assets to BSA (Birmingham Small Arms Company) in 1920, although it had no intention of continuing aircraft manufacture. De Havilland, along with 60 or so of his colleagues from Airco, formed the de Havilland Aircraft Company on September 25 that year, at London's Stag Lane Aerodrome.

Initial business included selling war surplus DH.4s (among other types) to overseas governments, while the de Havilland Aeroplane Hire Service and Reserve Flying School gave the company experience in the needs of private flying. This was supplemented by some modest Air Ministry contracts. As such, de Havilland began designing a series of local service airliners. He also studied several touring aircraft. Finding a suitable engine was a challenge, with expensive war surplus examples the only option.

With experience of such aircraft, de Havilland knew the ideal tourer had yet to be designed. He asked his gifted engine designer friend Frank Halford to produce a 60hp engine weighing 350lb. In early 1934, Halford took a surplus air-cooled V-8 Airdisco built by Aircraft Disposal Company and cut it in half to give him two four-cylinder engines, while retaining as many parts as possible to keep costs down. This allowed de Havilland to design a simple, yet revolutionary, dual controlled, two-seat wooden biplane boasting fabric covered wings, space for light luggage and a tool kit, folding wings to save hangar space, and simple maintenance in mind. With an endurance of up to three hours required, a cruising speed of 80mph would be achieved at

low power by keeping drag to an absolute minimum, while its first cost and running expenses had to be reasonable.

On February 22, 1925, de Havilland made the first flight of what was designated the DH.60 Moth – his life-long interest in entomology inspiring the name, while Cirrus was the name chosen for the engine.

His formula proved right – and almost instantly changed the firm's fortunes from a small-time player to a global enterprise. With de Havilland producing a practical and cost-effective machine, the British Government was prepared to provide financial assistance for civil flying clubs, resulting in 90 examples being ordered, while a service organisation was set up to support them.

The Moth gained excellent publicity when the company's chief test pilot Hubert Broad won the 1926 King's Cup Air Race – averaging 92.5mph in the 60hp machine! The success of early Moths resulted in a shortage of engines. With Frank Halford working as an independent designer, de Havilland set up an engine manufacturing capability, not just for the Moths, but also for other light aircraft manufacturers.

Design of a new engine boasting the traditional four cylinder in-line layout started in October 1926. Although it developed a huge 135hp on the test bench, it was down-rated to 100hp to

Below
Geffrey de Havilland aboard his de Havilland No.2 Biplane two-bay pusher around the time of its first flight in September 1910
KEY Collection

Left
Airco built DH.4A A7673 on an RFC airfield. Powered by a 375hp Rolls-Royce Eagle VIII, the 'A' was fitted with a taller undercarriage to give the propeller clearance on take-off
Philip Birtles Collection

Left below
The prototype DH.4 high-speed, two-seat day bomber, powered by a 200hp Beardmore Halford Pullinger (BHP) engine. Note the distance between the two cockpits – separated by a fuel tank, this caused communications difficulties between them

Below
Instone Air Lines DH.4A G-EAMU 'City of York' started life with the RAF as a standard DH.4 with the serial H5939. Seen here at Croydon Airport on August 9, 1927, this machine won the inaugural King's Cup Air Race in 1922. Piloted by Capt F L Barnard, it achieved an average speed of 123mph flying from Croydon to Renfrew near Glasgow, Scotland and back

conserve life – and guarantee reliability. The new engine was called the Gipsy, while the combination became the Gipsy Moth; the first production example was delivered in June 1928. To prove its reliability, an engine selected at random was fitted to a Moth and flown for some 600 hours with only routine maintenance. During nine months of flying, the cost of replacement parts was £7.15 – about £560 today!

In August 1929, Hubert Broad flew a Moth continuously for 24 hours, covering an estimated 1,440 miles using just 2.75imp gal of fuel per hour – another tick for reliability and cost. While the DH.60 was powered by several engines, the Gipsy Moth was the most successful – the type capturing many long-distance records.

International sales rapidly built up, creating the need for a global support organisation. By 1930, production at Stag Lane had reached three aircraft a day at an Ex Works-price of £650 – just over £8,100 today! When production ended in 1934, 595 Gipsy Moths had been rolled out.

Probably the best known such record was aviatrix Amy Johnson's epic 11,000-mile flight from England to Australia in G-AAAH – a machine she named *Jason*. Leaving London's Croydon Airport on May 5, 1930, she arrived at Port Darwin 19 days later to become the first woman to fly the route solo. Today, her Moth is preserved in the Science Museum in London.

Direct developments resulted in the DH.60M 'Metal Moth', DH.60G III Moth and DH.60T Trainer. The DH.60M was a more robust version with a metal tubular fuselage structure. Adopted in Canada, it was also ordered by the RAF for training and communications. The DH.60G Moth was easily recognized by its unique nose profile with an inverted

Above
The DH.60 Moth prototype – G-EBKT – airborne. Geoffrey de Havilland completed its first flight from Stag Lane Aerodrome on February 22, 1925

Gipsy II dubbed the Gipsy III Moth Major being used to improve forward visibility. This powerplant was later developed into the Gipsy Major used in the Tiger Moth. The DH.60T was the final step before the Tiger Moth, with two prototypes and 47 production aircraft built. Used to provide basic flying training, it was exported to Sweden, China, Egypt, Iraq and Brazil.

Moth development continued with two, three and five seat versions of the Fox Moth leading to a twin engine six to eight passenger Dragon – and then the more powerful Dragon Rapide, which was launched into service in 1934 by Hillman's Airways, Britain's first budget airline.

The 'Wooden Wonder'

Conceived during the furious months of the Battle of Britain at de Havilland's secretive 'Skunk Works' at Salisbury Hall in St Albans, the Mosquito was Britain's first multi role combat aircraft. Security was to keep it secret from the British Government. The project would have been cancelled by Lord Beaverbrook, Minister of Aircraft Production and the Air Ministry had they known about it. With the backing of AM Sir Wilfred Freeman, de Havilland built the prototype at their own expense as a private venture.

The design team, led by R E Bishop, moved into Salisbury Hall in October 1939 to work on what later became the DH.98. While the UK Government wanted all resources concentrated on existing designs, most were unfit for purpose. Looking at existing bomber specifications, which called for all metal, four engine heavily armed aircraft with seven men crews, speed was key.

Removing the defensive armament typically used against enemy fighters, two engines, and reducing the crew to just two – a pilot and navigator – reduced both weight and drag. The aircraft's structure was made from wood using non-strategic labour from across Britain's vast woodworking industry.

While the design team worked in Salisbury Hall, a barn-like hangar was erected nearby where the craftsmen built the prototype high-speed unarmed bomber powered by a pair of Rolls-Royce Merlin engines. Initially, as a private venture, the prototype

had no operational equipment fitted. It was capable of carrying four 500lb bombs – albeit with cropped vanes to allow them to fit in the bomb bay. To gain an initial measure of official support, the aircraft was built to meet Air Ministry Specification B.1/40 looking for an unarmed reconnaissance platform.

With the completed yellow painted prototype (initially E-0234, then W0234, and W4050 when adopted officially) moved down the road to de Havilland's Hatfield Aerodrome in October 1940, Geoffrey de Havilland Jnr, elder son of the founder and then chief

Below
A DH-4B of the US Mail Service – the type being redesigned with provision to carry mail bags in an enlarged front cockpit. In this variant's first year of service, it carried more than 775 million letters

"But the job was not to his liking – he wanted to design aeroplanes"

Left
This DH.60M Metal Moth, J9922, was the first of a batch of 11 airframes ordered for the RAF under Contract No.912850/29. In all 124 DH.60Ms were pressed into RAF service between 1929 and 1939

Left below
Famed aviatrix Amy Johnson poses with a Gipsy Moth of the London Aeroplane Club (LAC) at Stag Lane while learning to fly. Joining the LAC in 1928, she was awarded her pilot's license the following year. In 1930, she became the first woman to fly solo from London to Australia…

test pilot, made the first flight on November 25. Following successful trials, the first batch of 50 aircraft (out of an eventual total of 7,781) were ordered.

As trials progressed, batches of reconnaissance (PR), fighter (F) and bomber (B) versions were soon realised and ordered – an assembly line at Hatfield producing the bomber variant, while a similar set up was established at Leavesden near Watford to build the fighter. On May 15, 1941 the prototype NF.II night fighter flew for the first time from the fields by Salisbury Hall to save a month of dismantling and reassembly.

As production built up at Hatfield, the initial Mosquitos were delivered to the RAF – No.1 Photo Reconnaissance Unit at RAF Benson in Oxfordshire accepting its first PR in early September 1941. On September 16, less than two years from the start of design, the type flew its first operation.

While the bomber version featured a 'V' windscreen and crew entrance hatch under the nose, the fighter had a flat laminated windscreen, and the crew door placed on the starboard side – leaving space for four nose-mounted Browning .303 machine guns and four 20mm Hispano cannon below.

Similarly armed, the NF.II was also fitted with an Aircraft Interception (AI) Mk.IV radar. The day intruder equivalent has the radar removed and could carry two 500lb bombs in a smaller bomb-bay (dictated by the cannon breeches), as well as a 250lb bomb under each wing. Although the first NF.II unit, 157 Squadron, formed at RAF Debden in Essex on December 14, 1941, it was some time before they received their first fully equipped aircraft.

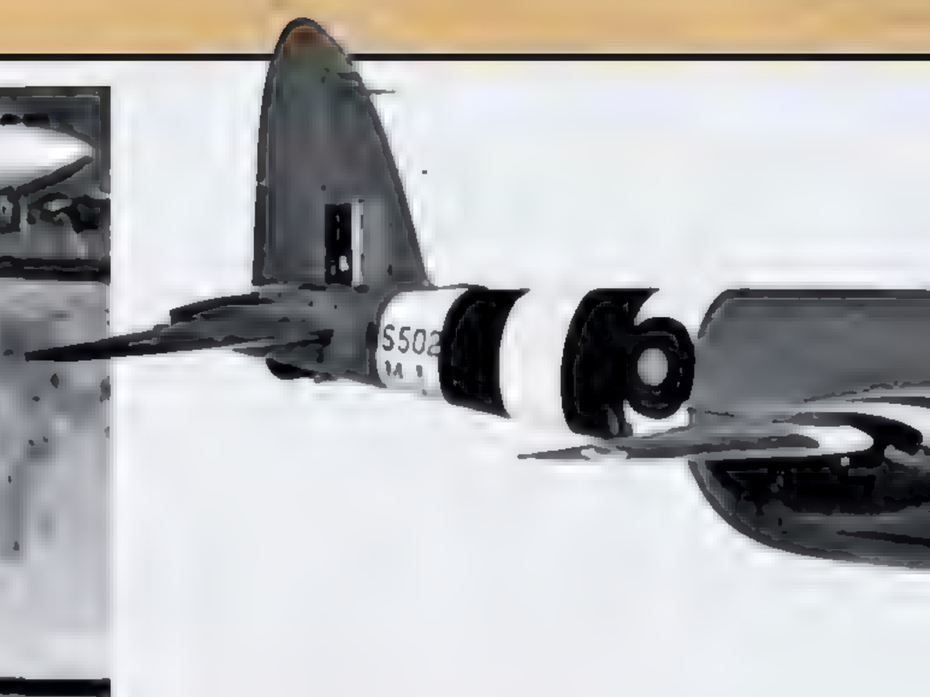
The dual control T.III was based on the fighter version, which was followed by the classic high speed unarmed bomber variant – the B.Mk. IV. Capable of carrying a 2,000lb bomb load, 105 Squadron at RAF Marham in Norfolk was the first to accept the type on November 15, 1941. With enough aircraft and crew trained, it flew its first combat mission – a raid on Cologne – at the end of May 1942 which demonstrated the Mosquito's superior performance over defending fighters and its suitability for low level precision attacks.

The unit put this into practice with a precision low level attack on the Gestapo Headquarters in the centre of Oslo, Norway, on September 17, 1942. However, as the unarmed aircraft were vulnerable at low level, armed

Below
The final variant of the DH.60 Moth series, the DH.60GIII Moth Major was powered by an inverted 120hp Gipsy III engine to improve forward visibility – as seen in this view of G-ADHE at what is thought to be Denham in 1953

Right
Geoffrey de Havilland holding a model of the Mosquito in his office at Hatfield sometime in 1943

Far right
De Havilland Mosquito PR.XVI NS502/M of 544 Squadron airborne out of RAF Benson in Oxfordshire during 1944. Although externally similar to the B.XVI, this variant boasted a pressurised cockpit and a pair of either Merlin 72/73s or 76/77s engines, as well as three overload fuel tanks in the bomb bay



FB.VIs were later used on such raids. That said, when fitted with special radios and navigation aids it was a very effective pathfinder.

Experience with the F.II led to the development of the FB.VI, many of which were produced by Standard Motors at Ansty near Coventry. In addition to carrying two 500lb bombs internally, another pair, or drop tanks could be carried under the type's universal wing. The FB.VIs could also be armed with a salvo of eight unguided underwing RP-3s (Rocket Projectile 3-inch) for ground attack and anti-shipping strikes.

Early FB.VI deliveries to 418 (Intruder) Squadron Royal Canadian Air Force at RAF Ford in West Sussex occurred during May 1943. Eight examples, together with several B.IVs – all civilian registered – were used by British carrier British Overseas Airways Corporation (BOAC) on unarmed high speed courier service between RAF Leuchars in Scotland and Stockholm in Sweden from February 1943 through until 1945.

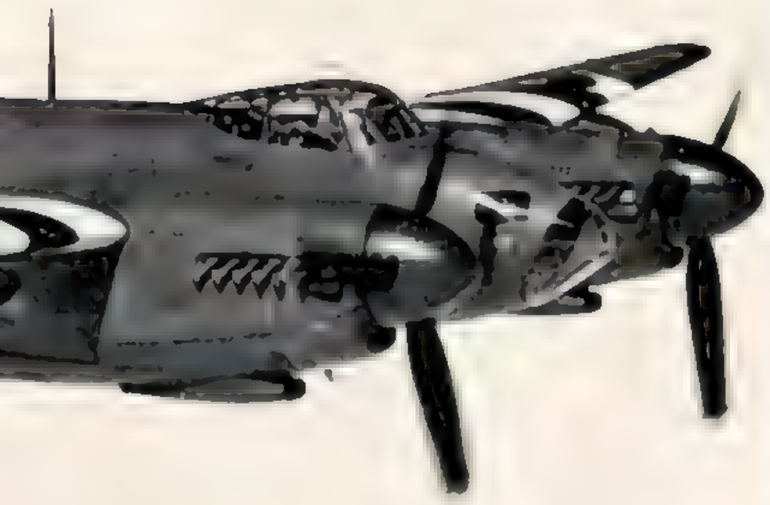
The main development of the FB.VI was the FB.XVIII – it's four 20mm cannon being replaced by a single 57mm Molins anti-tank gun. With 30 aircraft converted for RAF Coastal Command, they proved particularly effective against German U-boats in the Bay of Biscay.

Development of PR and bomber Mosquitos was generally in parallel and usually consisted of more powerful engines, including Merlin 61s and 72s – although sometimes resulting in small runs. For example, powered by a pair of supercharged Merlin 61s for high altitude operations, just six PR.VIIIs were built.

Produced for both roles, the Mk.IX was powered by Merlin 72 engines giving a ceiling of 36,000ft – and the PR version a range of more than 2,000 miles. A more powerful and pressurised pathfinder version of the B.IX, the B.XVI, was fitted with a 'bulged' bomb-bay to accommodate the monstrous 4,000lb 'Cookie' – or blockbuster – bomb. Just five of the lighter PR.32s were built, while the ultimate PR development came as the PR.34 powered by Merlin 113/114s and a range of some 3,500 miles. The equivalent bomber version was the post-war B.35, some of which ended their days as a high-speed target tugs dubbed TT.35s.

The other major Mosquito development was the NF family, which benefited from a stream of improvements as new advanced versions of its AI radar were produced by both Britain and

Below
November 25, 1940: The prototype DH.98 Mosquito (W4050) gets airborne from Hatfield for the first time with test pilot Geoffrey de Havilland Jr accompanied by the firm's chief engine installation designer by John Walker



"Among their successes was shooting down Zeppelin LZ.112 L 70 on August 5, 1918"

Above
This view of Mosquito NF.XVII DZ659 – seen here while in use with the Fighter Interception Unit at RAF Wittering – shows the type's ungainly 'bullnose'. With the nose mounted 0.303in machine guns replaced by an AI Mk.X radar under an electronically transparent radome, the aircraft retained its four 20mm cannon in a ventral tray under the forward fuselage

the US. The last Mosquito built in Britain was a NF.38 rolled out from the firm's Broughton factory in Flintshire, Wales on November 15, 1950. In addition to being produced widely in Britain, a further 1,034 Mosquitos were completed in Canada and 212 in Australia.

Mosquitos also served with the Fleet Air Arm – the first deck landing by a twin-engine aircraft was made by a modified Mosquito FB.IV, test pilot Lt Cdr Eric 'Winkle' Brown landing on the carrier HMS *Indefatigable* on March 25, 1944. This resulted in orders for manual wing folding naval variants dubbed the Sea Mosquito.

After the end of the war countless surplus examples were sold overseas. Today, the Mosquito prototype survives (together with an FB.VI and B.35) in the de Havilland Aircraft Museum, close to where it was created in 1940.

A new age

As World War Two came to an end, de Havilland's order books were full as it entered the jet age with its twin-boom Vampire, while its twin-piston Dove short-haul communications aircraft made its maiden flight on September 25, 1945. Busy production lines allowed de Havilland to invest in its pioneering DH.106 Comet – the world's first jet airliner. There were important lessons to be learned in developing what was the world leader in commercial jet airliners.

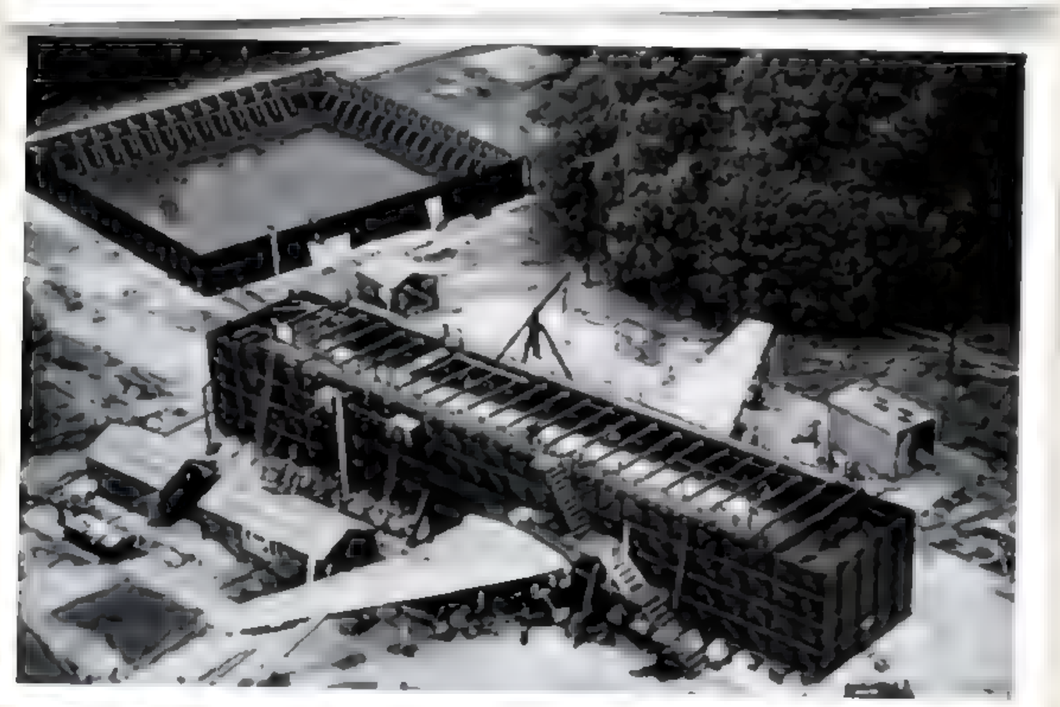
Both de Havilland's aircraft and engine companies contributed to the project – serious design work commencing in September 1946. Minimising risk, the firm developed existing technology and built two prototypes to the Brabazon Committee's Type IV design specification calling for a jet-powered 500mph airliner financed by the Air Ministry – and with an initial order placed by BOAC. Considerable research was done on pressurisation, insulation, structures and engines. While the ideal would have been power from four Rolls-Royce Avon turbojets, development was delayed – especially as the military variant was given priority for English Electric's Canberra. Frank Halford adapted de Havilland's own Ghost turbojet for civil use as the Ghost 50 developing 5,000lb st. This was the world's first commercial turbojet. Pressurisation was a well-known feature, but what was new was the high altitudes above the weather the Comet would operate to give a smooth and comfortable ride. De Havilland undertook numerous structural tests verifying the fuselage structure's strength at full pressure. And when that was successful, they doubled the pressure to make sure.

Weight control was critical due to the low power of the engines – although Avons were expected to become available for later versions. To keep weight down, Redux metal-to-metal bonding was developed which avoided drilling lines of weakening holes to fasten the fuselage skins to the stringers. Incredibly, the Redux bonding was stronger than the metal it fastened.

The first Comet (G-ALVG) was assembled in the Experimental Department at Hatfield and flew for the first time on July 27, 1949, with chief test pilot John Cunningham at the controls.

During a successful

Left
Mosquito FB.VI RS625/NE-D of 143 Squadron of the Banff Strike Wing airborne over Scotland in early 1945. Note it carries four RP-3 under the starboard wing. These, along with the type's standard weaponry made them incredibly potent machines – especially against shipping in the North Sea and Baltic



Top
The Comet prototype (G-5-1) gets airborne out of Hatfield on July 27, 1949, in the hands of de Havilland chief test pilot John Cunningham, co-pilot Harold 'Tubby' Waters, engineers John Wilson (electrics) and Frank Reynolds (hydraulics), and flight test observer Tony Fairbrother.

Above
Among the lessons learned from early Comet jet airliner operations was the need for dynamic structural testing – both stress and pressure. As part of the investigation into the first Comet loses, G-ALYU was tested to destruction in an immense set of pressure tests. Immersed in a 200,000-imp gallon water tank at RAE Farnborough, jacks under the wings reproducing the typical flight load profile over a four-minute cycle. It had undergone 1,230 pressurised flights before testing and 1,830 tank 'flights' before the fuselage failed

development programme, including hot and cold weather trials, it was found it could carry 36 passengers more than 2,600 miles. With the first commercial jet airliner Certificate of Airworthiness (C of A) awarded on January 22, 1952, BOAC commenced passenger services to Johannesburg, South Africa, on May 2 – less than six years after design work began. The project was on time and on budget.

BOAC ordered a proving batch of ten Comet 1s to introduce the concept of jet airliner operations, including ground handling and air traffic systems, and how to fit with the existing ones. Designed for use on the so-called 'Empire routes', including as far as Australia and Japan, export orders soon followed – although not just for the Comet 1, but later Avon powered Comet 2s and higher density Comet 3s.

Then came the first loss. On May 2, 1953, BOAC Comet 1 G-ALYV – returning to London from Singapore – departed India's Calcutta (now Kolkata) at night into a major storm. The turbulence was so violent the aircraft broke up under the extreme loads – all 43 on board were killed. As a result of this accident, weather radar was developed to avoid flying into the 'red' zone.

While BOAC Comet 1 G-ALYZ failed to get airborne from Rome airport on October 26, 1952 (without fatalities), Canadian Pacific Comet 1A CF-CUN had a similar accident taking off in bad weather from Karachi on March 3,1953 – killing the crew. Both aircraft had stalled during take-off due to the nose being pulled up too high – a result of crew's lack of understanding of the aircraft's performance. Most pilots then were used to flying propeller driven machines, the props generating extra lift over the wings during take-off. Jet engines buried in the wings negated this. The answer was to prove the aircraft would still take-off, even with the tailskid dragging along the ground, during subsequent test flying.

The worst losses were caused by metal fatigue – as discovered after BOAC's G-ALYP disintegrated after taking off from Rome on January 10, 1954 and G-ALYY on April 8, 1954, in similar circumstances; 56 people were killed. An immediate grounding and suspension of the C of A followed. It was discovered during the accident inquiry that the type's static testing was not sufficient, and that dynamic testing was also essential to reproduce the operational flight loads.

The aircraft was subsequently redesigned as the Comet 4 with a stronger cabin and more powerful engines. In addition to worldwide operations, which were quickly overshadowed by the Boeing 707, it was developed into a maritime reconnaissance platform for the RAF – the Nimrod. But that's a story for another time...

A major development was the Avon RA.29 powered Comet 4, which was launched into production with an order for 19 aircraft by BOAC. The first aircraft, G-APDA, is seen here in front of the iconic flight test hangar at Hatfield in 1958

The Comet 4 converted Nimrod prototype XV148, is seen here visiting Hatfield during its flight development programme. Note that unlike the production versions, it boasted a full set of cabin windows Philip Birtles Collection

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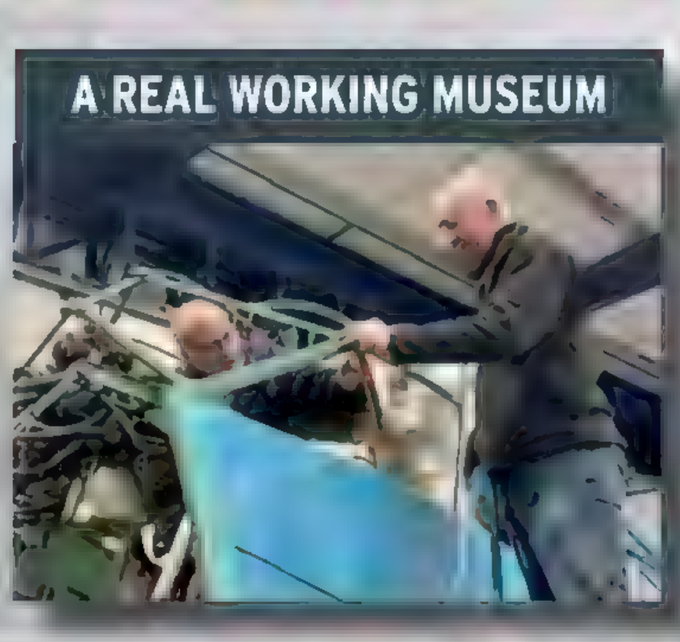

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Mustang 'Moonbeam McSwine' UK bound

Rumours that another airworthy North American P-51D Mustang was destined for the UK were confirmed on November 20 when it was revealed that 44-12473/HO-W *Moonbeam McSwine* had been added to the UK Register as G-MCSW.

It's been acquired by Biggin Hill-based Warbird Experiences from Moonbeam Historic Military Aircraft of Waukegan, Illinois, with whom it flew in the US as N51VL. An arrival date had yet to be confirmed when *FlyPast* closed for press.

The former US Army and Salvadorian Air Force machine turned air racer and Grand Champion Warbird was built in 1944 and represents the wartime mount of the 487th Fighter Squadron, 352nd Fighter Group's Capt William T Whisner who ended the war credited with 16.4 'kills' (including six in one day). He later served in Korea, flying the F-86 Sabre to score several more victories – he is one of only seven US pilots to achieve ace status in two wars.

Two-seat Spitfire arrives at Sywell

Supermarine Spitfire Tr.IX MH367 has joined Ultimate Warbird Flights at Sywell, Northamptonshire. It arrived at its new home on November 13 and will add to the company's capacity to deliver Spitfire flights, though ML407 – the 'Grace Spitfire' – will remain the main aircraft used.

Built in 1943 as a single-seater, MH367 served with 65 and 229 Squadrons, followed by a stint with 312 (Czechoslovakian) Squadron. Written off in 1948 following a landing accident, its remains were recovered by Tim Moore from the Flowers Scrapyard near Chippenham in around 1999.

Restoration was started by Dick Melton for Charles Church using components from other Spitfires, and it was converted into a 'Grace-style' two-seat configuration before export to the US. Flying again by 2006, painted in the markings of USAAF pilot Maj Robert Levine, it was sold in 2008 to New Zealand and registered ZK-WDQ. The fighter was repainted in the North African campaign colours of New Zealand's highest scoring ace, Sqn Ldr Colin Gray.

Since its arrival in the UK, MH367 has been stripped of paint and various parts have been removed for overhaul. It's expected to start flying for its new keepers during 2025, potentially providing an opportunity for customers to fly alongside friends and family as a Spitfire pair from Sywell.

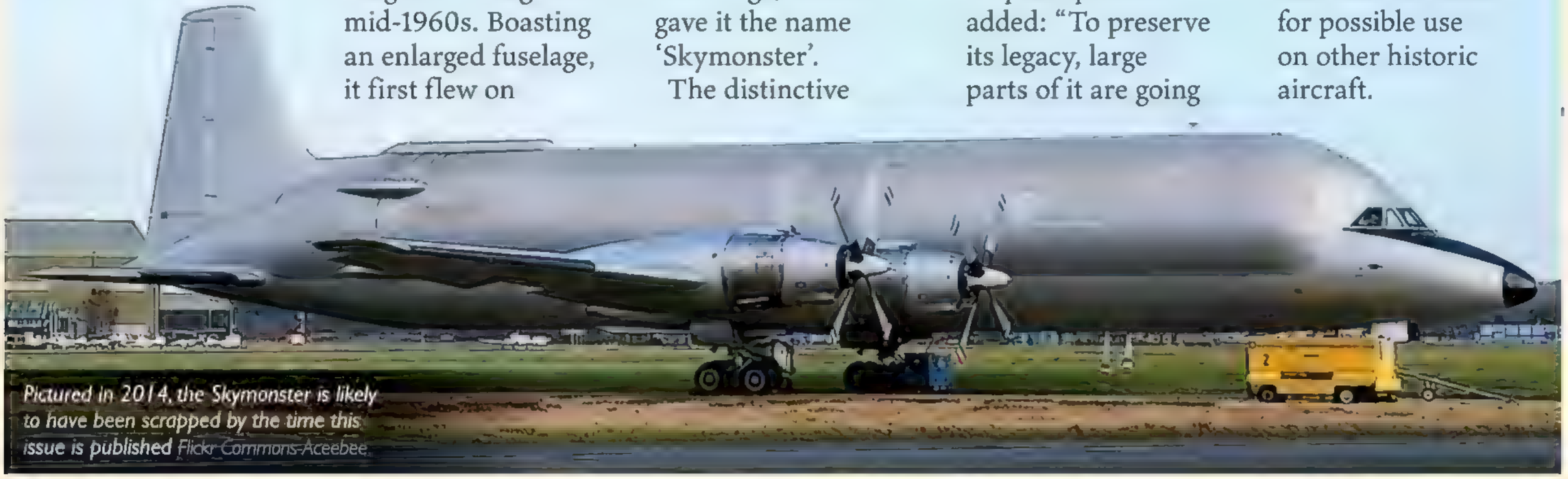
The fuselage of MH367 s hortly after arrival at Sywell
Darren Harbar

End of the line for 'Skymonster'

Shortly before this issue closed for press, it was announced that the sole Conroy CL-44-0 Skymonster (N447FT) was to be scrapped.

A long-term resident of Bournemouth International Airport in Dorset, the Skymonster was developed from the Canadair CL-44 freighter during the mid-1960s. Boasting an enlarged fuselage, it first flew on November 26, 1969, and was operated by numerous carriers, including Flying Tiger Line, HeavyLift Cargo Airlines, and Transmeridian Air Cargo, which gave it the name 'Skymonster'.

The distinctive machine has been in storage at Bournemouth for many years, during which numerous attempts were made to return it to flight. A spokesperson added: "To preserve its legacy, large parts of it are going to the South Wales Aviation Museum at St Athan where we are pleased that they will go on public display." Other parts will also be retained and made available for possible use on other historic aircraft.



Pictured in 2014, the Skymonster is likely to have been scrapped by the time this issue is published Flickr Commons-Aceebee

Impressive new scheme for Farnborough Hunter

Volunteers at the Farnborough Air Sciences Trust have repainted the first production Hawker Hunter T.7. First flying on October 11, 1957, XL563 was allocated to the A&AEE at Boscombe Down. It then served the Institute of Aviation Medicine at Farnborough from May 2, 1963, and now sports the striking colours it wore during its early years there before taking on the more traditional 'raspberry ripple' livery Richard Hall

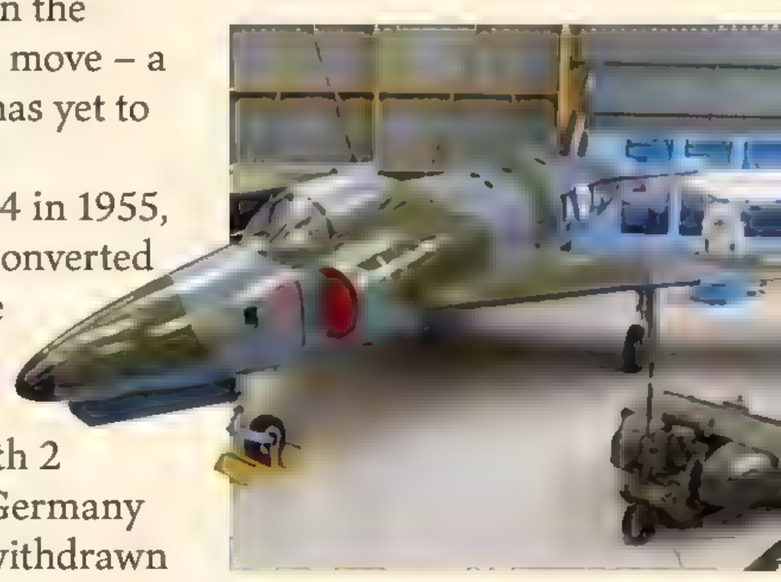
Newark Swift set for move to Wales

Supermarine Swift FR.5 WK277 has been gifted to the South Wales Aviation Museum at St Athan after being on long-term loan to Nottinghamshire's Newark Air Museum for many years.

The jet is one of just two surviving examples of the single-seat tactical reconnaissance aircraft and is classified as a 'National Benchmark' on the National Aviation Heritage Register. Potential changes planned for Newark's Hangar 2 mean the Swift is on the move – a delivery date has yet to be confirmed.

Built as an F.4 in 1955, WK277 was converted to an FR.5 the following year. It served exclusively with 2 Squadron in Germany before being withdrawn from use in April 1961. After periods spent in storage and with Cosford's No.2 School of Technical Training, it was acquired by former Vickers test pilot Desmond 'Dizzy' Addicott who hoped to convert it into a record-breaking jet car. The dismantled machine was then obtained by Mr N Pratlett who delivered it to Newark in 1969. Museum volunteers have restored it to its former glory.

Swift FR.5 WK277 at Newark Air Museum in 2020 Alan Wilson



Duxford stages 1940-themed exhibition

Imperial War Museum (IWM) Duxford in Cambridgeshire has announced its winter spotlight exhibition for 2024/25.

Scramble! The Summer of 1940 will be open to general admission visitors at Duxford from December 27, 2024, until February 23, 2025. The IWM says the exhibition "will explore the history of two of the Second World War's major aerial campaigns, the Battle of France and the Battle of Britain, through the aircraft and aircrew who engaged the Luftwaffe in battle".

It is the latest in the IWM's winter spotlight exhibitions at Duxford, following on from *Spitfire: Evolution of an Icon*, *Hurricane: Unsung Hero*, and *Spies in the Skies: Second World War Aerial Reconnaissance*. KEY-

Mark Broadbent

Hurricane Mk.I R4118 will be one of two examples of the Hawker fighter at the exhibition KEY Collection

Old meets new for tribute flypast

On November 7, 2024, a pair of USAF Lockheed F-22 Raptors were joined by ex-Polish Air Force Mikoyan Gurevich MiG-21UM *Fishbed* N317DM of Wilmington, Delaware-based G-Loc Fighters, and Jared Isaacman's former Ukrainian Air Force MiG-29UB *Fulcrum* N29UB for a flypast over Nevada's Nellis Air Force Base.

The flight was a salute to Col Gail 'Evil' Peck who died aged 83 on October 10. A respected fighter pilot and leader, Peck was the first commanding officer of the 4477th Test and Evaluation Squadron. Better known as the 'Red Eagles', the unit is famed for the once classified evaluation and testing of foreign aircraft technology – including numerous MiGs – to train US military pilots and weapon systems officers in tactics relating to dissimilar air combat.

Starfighter to receive attention in Ohio

Staff at MAPS Air Museum in Green, Ohio, have recently completed restoration work on Republic F-105B Thunderchief 57-5820 and are now turning their attention to Lockheed F-104D Starfighter 57-1322. The Thunderchief has been with MAPS since October 2011 while the Starfighter was formerly at Dayton, Ohio's National Museum of the USAF but was damaged during a February 2024 tornado
Tony Sacketos

REC

Get your timepiece today

The X4009 is a limited-edition timepiece made from Mk1a Spitfire aircraft X4009, flown by the Australian fighter-ace Pat Hughes during the Battle of Britain.

www.recwatches.com

Sikorsky delivered to Argentinian museum

Argentina's Museo Nacional de Aeronáutica (MNA/ National Aeronautics Museum) unveiled its recently restored Sikorsky H-19A Chickasaw H-4 on November 9 at its Morón Air Base home.

The aircraft, acquired in 1971 after retirement from the Argentinian Air Force, is 55-157 and previously served the USAF as 51-3886. It has been refurbished over five years by volunteers from the Grupo Técnico de Restauraciones Aeronáuticas (GTRA).

Although H-4 was prepared for static display, the team went so far as to disassemble and restore its Pratt & Whitney R-1340 engine and replaced missing flight instruments by creating replicas using innovative, 3D printing techniques. The unveiling ceremony featured flypasts from T-34 Mentors and Hughes 500 helicopters.

Ramiro Piacenza

Chickasaw H-4 has been painted in the livery of former operator, Brigada Aérea Courtesy GTRA

New paint for museum-bound Fokker

F-27M Maritime D.2-01 at Cuatro Vientos in October prior to its move Roberto Yáñez

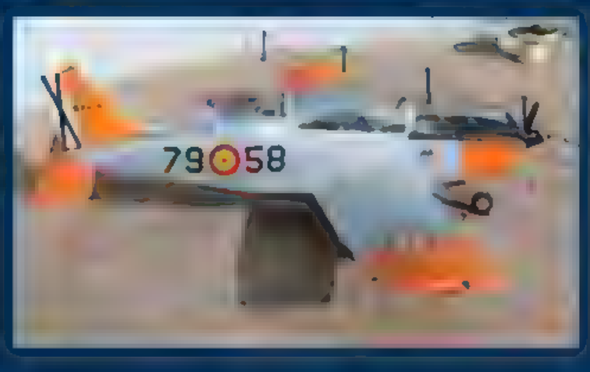
Fokker F-27M Maritime D.2-01, one of three operated by the Spanish Air Force's 802 Escuadrón since the late 1970s, has been repainted prior to its transfer to the Museo del Aire at Cuatro Vientos, Madrid.

Built by Fokker as 10-581 in 1978, it entered service in Spain from Grando in the Canary Islands on February 28, 1979. It was operated by the squadron on SAR missions until December 2013 when the type was replaced by the CASA C-295 VIGMA (Vigilancia Maritima, maritime surveillance). With two of the three Fokkers remaining in open storage at Cuatro Vientos, D.2-01 will be soon towed to the museum, where it will be on public view in its distinctive livery.

Roberto Yáñez

briefings

Two examples of the ENAER T-35C Pillán trainer have been preserved in Spain recently, the first (E.26-13/79-60) at Torrejón Air Base and the second (E.26-11/79-58, pictured) in the school yard of Colegio Menor Nuestra Señora de Loreto, both Madrid. Both are painted in Academia General del Aire colours, and at least one more is likely to be saved. Roberto Yáñez



Montrose Air Station Heritage Centre unveiled a new tribute to the RAF over the November Remembrance weekend. The gable end of the museum's Ross Robertson Building is now graced by three new window panels each depicting a classic military aircraft. Chairman Stuart Archibald welcomed it as a fitting tribute to those who served at the Scottish base. MASHC

The Spitfire & Hurricane Memorial Museum
Manston, Kent

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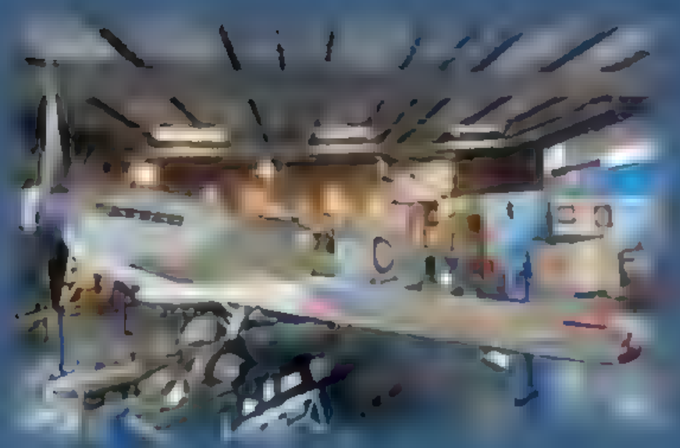

Our Museum is home to Spitfire Mk XVI (LF) TB752 & Hawker Hurricane IIC LF751 (Displayed as BN230). Come and explore the history of these two iconic aircraft together with a host of other exhibits telling the story of the RAF at war and life on the Home Front.

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Please phone the Museum on 01843 82 1940 or visit www.spitfiremuseum.org.uk/simulator for more information.

Retired helicopter revived by collector

Mi-2 SP-MXM pictured in Madrid on November 4 Roberto Yáñez

Formerly operated in Spain by Polish group Aviation Service Company Heliseco, Mil Mi-2 513904015 has now been acquired by a private collector, who has restored it an attractive military scheme. The helicopter, originally built by PZL Swidnik in 1975, never actually wore this scheme and last flew as SP-MXM on the Spanish civil register.

After working with firefighting campaigns in association with the Spanish operator Hispánica de Aviación, Heliseco tried to introduce the Mi-2 to the agricultural market but found little interest. This example, an upgraded version equipped with improved avionics, rotor blades and GTD-350W2 engines, ended up in storage from late 2012.

Roberto Yáñez

Work begins on classic Cessna in Chile

Chile's Museo Nacional Aeronáutico y del Espacio (MNAE) received Cessna 140 CC-PRB in August and has begun what is likely to be a lengthy restoration. The aircraft had been abandoned in the open for nearly a decade at Carriel Sur airport at Concepción. MNAE has also received a pair of damaged helicopters from Airbus Helicopters Chile. Álvaro Romero

Hercules put on display in Poland

Former Polish Air Force Lockheed C-130E Hercules 1503 was placed on external display at Muzeum Sil Powietrznych in Deblin, Poland on August 22. After its arrival in July, its engines were replaced with older units from Powitz on August 20 as they still had around half of their usable lifetime remaining. Propellers were added the following day. Raymond van Dijkhuizen

briefings

Hawk T1 XX317 has been installed as a 'gate guard' outside RAF Leeming in Yorkshire. Originally delivered to the RAF in 1980, it flew with several units and today wears the colours of its final user, 100 Squadron. First placed on show at Leeming in 2022, it carries the names of both its first OC, Maj M G Christie, and its last, Wg Cdr J M Taylor-Head. Derek Bower

Noted US warbird pilot Louis Horschel has acquired John Sessions' former 376th FS North American P-51B Mustang 42-106638 *Impatient Virgin*. Lost on June 22, 1945 following an engine fire near Downham Market, Norfolk (pilot Wade C Ross survived the incident), the 1943-built fighter was returned to the skies by Idaho's Pacific Fighters in 2008

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CLOSING DATE: 28th February 2025.

093/25

Australian show debuts for ex-military aircraft

A former RAAF Pilatus PC-9A made its first airshow display in civil hands at Temora's Warbirds Downunder Airshow in October.

Flown by Steve 'Boris' Bekker, VH-ZYK had flown with the RAAF's 2 Flying Training School as A23-018. Noted as being sold just prior to the event, it's likely that more ex-military PC-9s will be restored soon. The show also hosted the first public display from the Historic Aircraft Restoration Society's UH-1H Huey VH-X9S. The unusual reg is a recent alpha numeric coding approved by the Australian Government, in this case denoting that the machine is 'eX 9 Squadron'.

Phil Buckley

Steve Bekker airborne at Temora in VH-ZYK Phil Buckley

Aviation exhibits on the move in Australia

The fuselage of MB326 A7-023 arrives at its new home Courtesy Darryl Gibbs

Australia's Clyde North Aeronautical Preservation Group (CNAPG) has had a busy few months, acquiring new cockpits and relocating several aircraft and display memorabilia.

Its Australian Aviation Museums Display can now be seen at the rear of the Table Top Hotel (formerly the Ettamogah pub) about 15km north of Albury, New South Wales. It features photographs and memorabilia promoting Australia's many aviation museums, plus CNAPG activities.

The fuselage pod from Vampire A79-807 has also arrived, along with Macchi MB326 A7-023, and the cockpit of Dakota VH-UPQ. The cockpits of F-86 Sabre 53-4036 and Aero Commander VH-BTN are expected to join them soon. A DC-2 fuselage is likely to remain at its current home in Lavington.

With thanks to Darryl Gibbs

We Salute You

Lt Col Peter Cameron MC RM – led No 3 Commando Brigade Air Squadron during the Falklands War often flying his Gazelle in appalling weather to support troops – died on October 28, aged 84; Flt Lt Gunnar Christophersen DFC – pilot on 221 Squadron flying Wellingtons on anti-shipping 'ops' from North Africa; also part of the crew that flew Churchill to Yalta – on August 28, aged 103; Lt Cdr Tony Fane – flew Sea Furies during the Korean War and later won the CFS aerobatics competition – on September 1, aged 98; Sqn Ldr Chris Golds AFC – Hunter pilot who served in UK and Aden, later an aviation artist, aero-modeller and writer – on November 8, aged 88; Sqn Ldr Rick Groombridge – flew Lightnings and Phantoms with 29 Squadron and the Tornado F3 as instructor; also OC BBMF where he flew the Lancaster – on October 12, aged 84; Wg Cdr Percy Reynolds DFC* - bombing leader on 186 Squadron Lancasters who later commanded 12 Squadron flying Canberras – on July 14, aged 102; Robert 'Bob' Somerville – survivor of the 1984 LAPG Vickers Varsity crash – on August 30, aged 83; Flt Lt Johnnie Trotman DFC* - Wellington pilot who transferred to 692 Squadron flying Mosquitos; completed 70 bombing 'ops' including 17 to Berlin – on August 27, aged 102.

Sea Dragon flies to museum home

Florida's Valiant Air Command museum welcomed former US Navy Sikorsky MH-53E Sea Dragon BuNo 160633 to its Titusville base on October 16. Nicknamed 'Dragon 437', the airframe is on permanent loan from the National Naval Aviation Museum and will undergo demilitarisation before being placed on display. Valiant Air Command-Rob Shaw

STAR LETTER

An airport in King's Cross?

Thank you for your wonderful magazine, always an interesting read. This might have featured in the past but may prove of interest. In the 1930s an idea was suggested for a rooftop airport by King's Cross in London, which at the time had no high-rise buildings. The design resembled a wheel with runways as the spokes. One can only imagine what the consequences might have been had it been approved!
Christopher Rudd
Reading

Editor's reply: *Thank you for this intriguing information! We've found this image dated June 8, 1931, showing a model of the proposed airport above the streets of King's Cross, London. The model is being examined by architect Charles W Glover. Also of note, decades later in 1961 the same architect proposed moving Covent Garden to a newly built building which would have a heliport on top.*

Charles W Grover and his concept for a King's Cross airport Fox Photos/Getty Images

I flew in the Elvington Meteor

I was delighted to see in *FlyPast*'s October 2024 issue that Meteor NF.14 WS788 is being restored so comprehensively at Elvington in Yorkshire.

This aircraft features in my logbook in the final month of my year-long navigator training course in 1962 at Stradishall in Suffolk. It was an introduction to high speed and high-altitude flight, not achievable in the venerable Vickers Varsity with its 150kts trundle.

This led to successful tours on the English Electric Canberra and Handley Page Victor, but it was probably just as well that we navs under training were not aware of the early low-powered twin jet problem of asymmetric flight at low speed. As it was, we sat back, checked the GEEbox [electronic navigation system] occasionally and just enjoyed the ride!
Francis de Beer
Petersfield, Hants

Meteor NF.14 WS788 is being restored by Graham Buckle and his team at Elvington Graham Buckle

Tribute to top scoring Spitfire ace

I read with interest the great article by Dilip Sarkar in the November issue. He states at the end that the only marker to the late AVM 'Johnnie' Johnson is a bench. However, I can tell you that there is a Blue Plaque fixed to a house in Barrow-upon-Soar, Leicestershire. It was at this address that 'Johnnie' was born and bought up. The Borough Council funded the plaque, and it was installed some three years ago in the presence of Johnson's son, representatives of local schools, RAFA and the local council.
Neale Millett
Wigston, Leicestershire

A blue plaque pays tribute to 'Johnnie' Johnson in Barrow-upon-Soar Neale Millett

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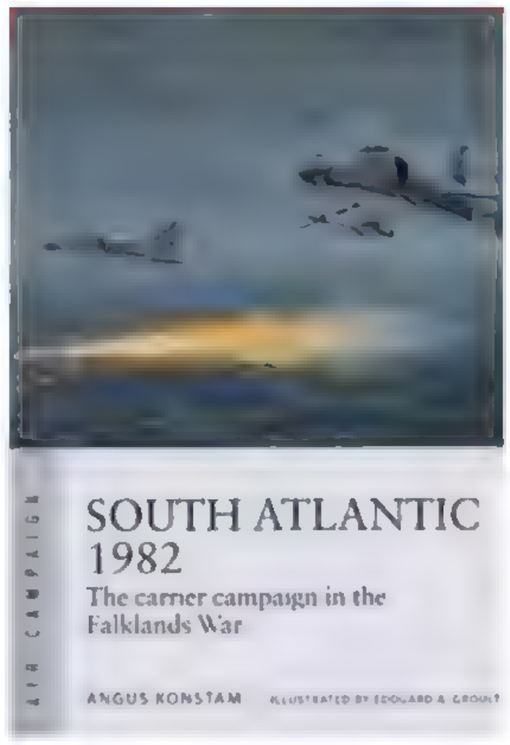
Falklands War

www.ospreypublishing.com
SOUTH ATLANTIC 1982 – THE CARRIER CAMPAIGN IN THE FALKLANDS WAR by Angus Konstam, SBK, ILLUS, 96PP, £16.99

Written by a former Royal Navy officer, this well-written account concentrates on aircraft carrier operations during the Falklands campaign. As well as a chapter outlining the campaign objectives in which the two RN carriers were pivotal, there are individual chapters profiling both British and Argentine aircraft and weapons. These set the tone for a detailed account of the campaign itself – courageous actions by individuals from both sides are given equal prominence. The narrative gives a short analysis of the war and offers some



conclusions. The book is profusely illustrated with rarely seen images, plus useful maps and diagrams that illustrate specific attacks. The six pages given over to DPS paintings of the actions could perhaps have been better used, but this is certainly a well-constructed and reasonably priced account of the 1982 war. **Andrew Thomas**

Night hunters

www.ospreypublishing.com
WILDE SAU NIGHTFIGHTERS by Martin Streetly, SBK, ILLUS, 96PP, £16.99

As the RAF Bomber Command night offensive expanded, the Luftwaffe countered the developing threats with new technology and tactics. One of the most innovative was the employment of heavily armed day fighters flying independently over targets to attack heavy bombers silhouetted against the flames or illuminated by searchlights. This useful volume examines these tactics through to the concept of the Wilde Sau (Wild Boar), in part developed to counter RAF countermeasures to German radar. The Wilde Sau missions are described as well as the radar

technologies used by the protagonists, with particular emphasis on the use of such devices in single-engined fighters. There's also an interesting analysis of their effectiveness. This useful volume concludes with brief biographies of some notable Wilde Sau pilots. It's a very useful addition on a subject seldom given detailed coverage. **Andrew Thomas**

REC's Spitfire Collection

www.recwatches.com

Danish manufacturer REC has released a series of four themed watches that honour the Australian Battle of Britain ace 'Pat' Hughes DFC. Hughes and X4009 were credited with 15 victories during the Battle before their loss in combat on September 7, 1940. In the late 1960s enough of the Spitfire's wreckage was recovered to enable a rebuild to airworthy condition which is currently progressing. Aluminium from X4009's fuselage has been incorporated into each timepiece which allows customers to contribute to the Spitfire's restoration fund.

The X4009 collection is available in four colours – blue, grey, green and black. The latter two variants were sent to *FlyPast* for assessment. The case, each with an individual serial number, is of stainless steel with sapphire crystal glass while the case back has a glass cover to reveal the intricate inner workings. The case is water resistant to a depth of 100m. The watch face carries the discreet wording (US spelling) "IN HONOR OF PATERSON C HUGHES BoB FIGHTER ACE" on the left side and "MK.I X4009" on the right, and has a small 'second hand' at the 6 position. All are equipped with automated and manual winding, plus luminescent hands, indexes, and rails. The colour coordinated leather strap has white stitching and incorporates a stainless-steel quick release system. As always with such top-end timepieces their 'look and feel' provide the ultimate test of the product and the X4009 range is a worthy tribute to a brave young man. **Tom Allett**

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Mosquito magic!

Philip Birtles reports on the epic near 50-year restoration of de Havilland Mosquito FB.VI TA122 ...

The volunteers at the de Havilland Aircraft Museum, Britain's first aviation museum, recently celebrated the completion of the restoration of Mosquito FB.VI TA122 after nearly half a century of work. The project was started by Stuart Howe who achieved the donation of the fuselage to the museum, located in London Colney, Hertfordshire, during late 1975, and final delivery there on February 26, 1978.

Hatfield to Colney

This Hatfield-built aircraft was delivered to No.44 Maintenance Unit at RAF Edzell, Scotland, on March 8, 1945, and soon issued to 605 Squadron Royal Auxiliary Air Force at Koksijde in Belgium on April 3. There it was adopted by 605's Officer Commanding, Wg Cdr Angus Horne, as 'UP-N'. He flew this machine on its only combat sortie – a night intruder mission to Esens in northeast Germany on May 2. With the end of the war in Europe declared just a week later, Horne was posted to HQ 2 Group Communications Flight at Evere, Belgium, that August, and later Gütersloh in Germany – taking TA122 with him. Following a period of storage and maintenance, the aircraft was issued to IV Squadron at Wahn when 605 Squadron was renumbered on August 31 as part of 140 Wing.

Retaining the 'UP' squadron code, it adopted the aircraft code 'G'. It remained on strength with IV until the arrival of its de Havilland Vampire FB.5s during summer 1950. Struck off RAF charge on June 29 that year and used for spares, TA122 sat at RAF Celle in Germany's Lower Saxony until it was bought for the equivalent of £15 (some £600 today!) a year later by the Delft University in the Netherlands as a training aid – albeit minus its engines, armament, and most of the cockpit instrumentation. For the move, the wings were sawn off at the roots. When Delft's aeronautics department was later rehoused in a smaller building, the wings were cut into smaller sections. By 1965 the fuselage was placed in storage pending a decision on its future.

With the museum – then known as the Mosquito Aircraft Museum – already home of the Mosquito prototype (W4050) and a late Hatfield-built B.35 (TA634), there was a perceived gap to be filled by a fighter variant. Aware of TA122's fuselage. Stuart began negotiations in April 1975 – which proved

With much of its fabric missing and holes throughout, the fuselage of TA122 shortly after arriving at the museum on February 26, 1978. Stuart Howe, wearing overalls, watches as it makes its way to towards the museum's Robin Hangar Philip Birtles

This is the only known image of Mosquito FB.VI TA122 in RAF service – captured during an AOC inspection at Celle while with IV Squadron in 1949 Ian Dick

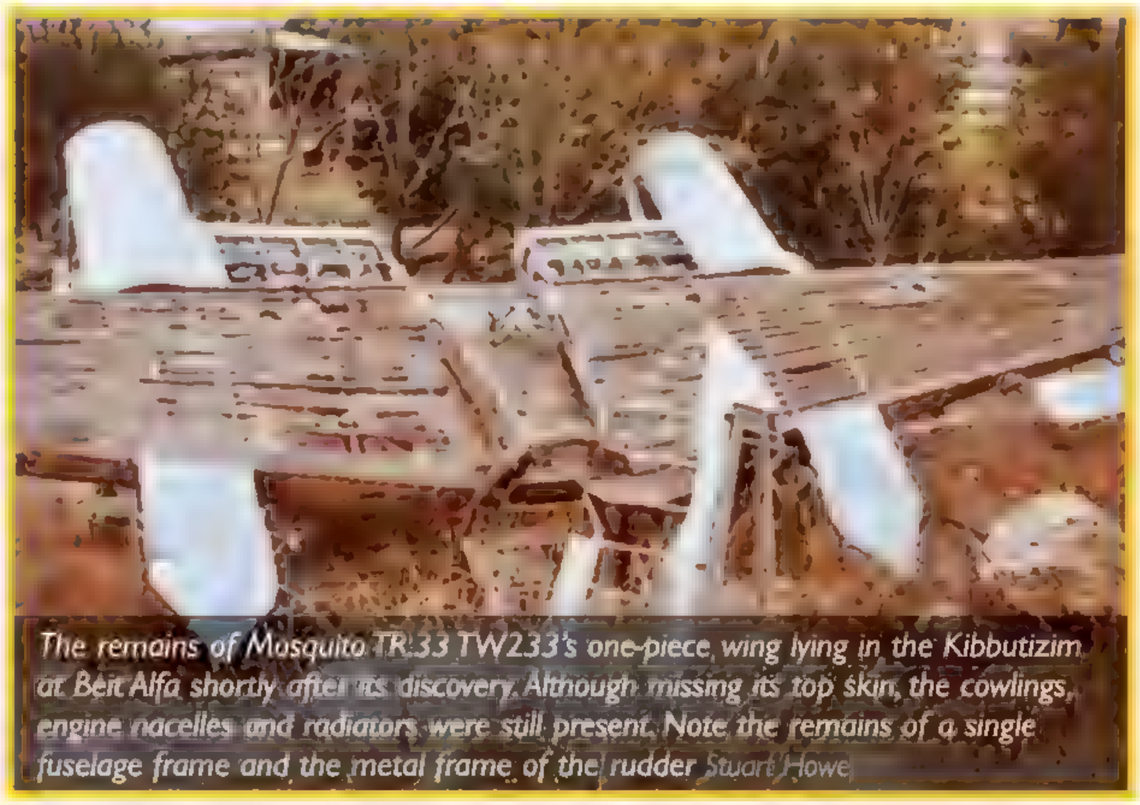
Formally rolled out on Sunday October 13, 2024, Mosquito FB.VI TA122 looks magnificent in 605 Squadron Royal Auxiliary Air Force markings after a near 50-year restoration Philip Birtles

successful that November. The next challenge was transportation to the museum. Achieved free of charge with the help of the Dutch Lips Autotron automobile museum, the fuselage and tailplane arrived on February 26, 1978. There, they were placed alongside the prototype in its hangar, where it is thought some preservation was possible.

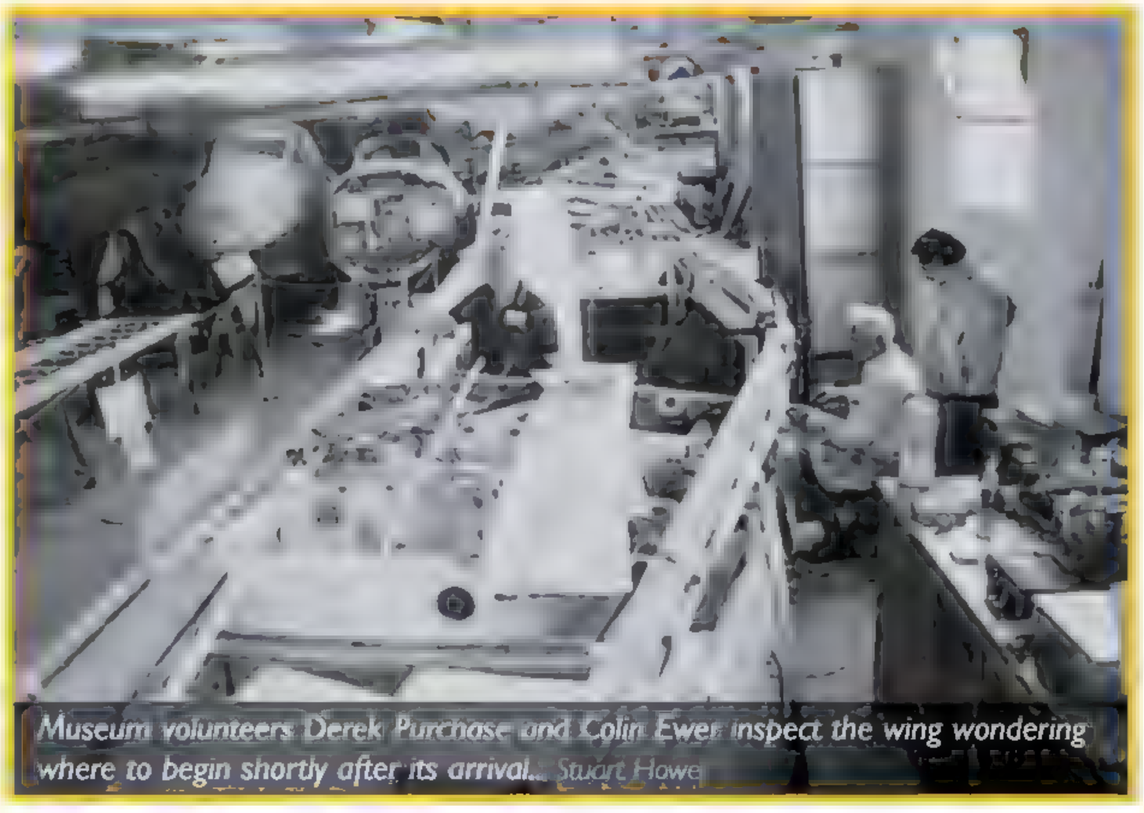
The long road

The arrival triggered the plan to acquire enough parts to restore Mosquito TA122. Just two months after TA122's arrival, news came from Robs Lamplough (a pioneer of the UK's warbird movement during its formative days in the 1970s) of four derelict ex-Israeli Air Force Mosquitos in Israel. On following this up, it was found one airframe, albeit in poor condition, was still present in Kibbutzim Beit Alfa in northern Israel. While the ply and balsa fuselage had long since rotted away, the main wing structure was generally sound – although the top skin, leading edge and trailing edge fairings, including flaps, were missing. Luckily, most of the metal parts, including the main undercarriage legs, radiators, engine cowlings, and nacelles, had survived. This particular airframe had been built as a Sea Mosquito TR.33 (TW233) – some of which had manually folding wings, but fortunately not this one. It did mean however that the undercarriage was a Lockheed oleo-pneumatic type suited for deck operations, and not applicable to an RAF FB.VI. While the wing wasn't far off being used as firewood, it was recovered and kindly shipped to Britain in an El Al Boeing 747 freighter in July 1980. To fit, the rear of the Mosquito's engine nacelles were removed. However, during the transit the port wing tip was damaged.

On arrival at the museum, the wing was put into the workshop where it was surveyed to decide what could be salvaged, and what was scrap. It soon became clear that all the ply needed replacing – but most of the spruce structure was recoverable. The restoration commenced in 1985 with the wing initially laid flat on trestles, while each rib was removed from the centre section outwards in turn to maintain the overall structural integrity – new birch ply ribs being cut and bonded to the spruce members. With the wing structure stabilised, it was positioned on to its leading edge main front spar – similar to when it had originally been built. This allowed the main wing skin ply to be shaped and fitted – the top double layer being separated by Douglas fir stringers. Work was also carried out on the

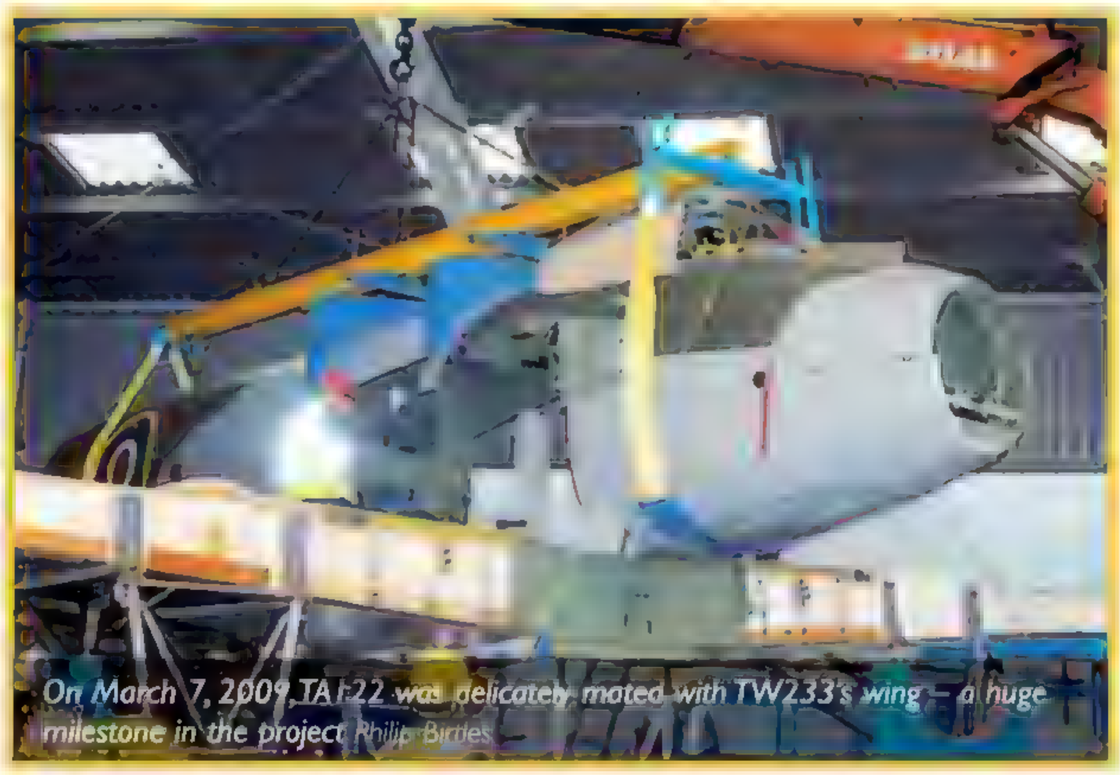


The remains of Mosquito TR.33 TW233's one-piece wing lying in the Kibbutzim at Beit Alfa shortly after its discovery. Although missing its top skin, the cowlings, engine nacelles and radiators were still present. Note the remains of a single fuselage frame and the metal frame of the rudder Stuart Howe



Museum volunteers Derek Purchase and Colin Ewer inspect the wing wondering where to begin shortly after its arrival... Stuart Howe

TW233's wing on the move to join TA122 for the first time in the main hangar. This underside view shows the starboard outer fuel tank bay door fitted – the two dark green areas are stowage for the mainwheels



On March 7, 2009, TA122 was delicately mated with TW233's wing – a huge milestone in the project Philip Birtles

inner lower wing skin, the fuel tank bays either side of the undercarriage housing, these being covered by stress preformed bolted panels.

In August 2000, after some 15 years, it was time to move the basic wing structure into the main hangar and prepare to mate it with the fuselage – this having been repaired and recovered, while work on various systems, including fitting out the cockpit, had been started. New wing leading edges and trailing edge shrouds were created using available drawings, and various Mosquito parts were sourced and acquired from across the world – including main undercarriage legs, bomb and gun bay doors, spinners, and engine back plates. A pair of new root ribs from the museum's own stores replaced the badly damaged originals.

Job done!

It was established during the restoration that TA122 had served with 605 Squadron at the end of World War Two. A unit that still exists today at RAF Cosford in Shropshire specialising in logistics and security, it has now adopted TA122.

Mating the wing and fuselage required careful planning. With a large cut-out in the fuselage aft of the wing, a major weak link was identified that had to be supported by jury struts during normal operations. However, these had to be removed when the fuselage was lowered on to the wing, requiring a neutral loaded support provided by a metal beam and wide straps. As soon as the fuselage had been lowered and cleared the wing's underside, the jury struts were replaced. With this achieved on March 7, 2009, it was only the start of assembly – the engine bearers, Merlin 25s overhauled by the Rolls-Royce Heritage Trust, propellers, radiators, undercarriage and many parts being added. The two section flaps incorporating original torque tubes were made from drawings, built in jigs, and then fitted. Meanwhile the tail unit was fitted together with the tailwheel. A major challenge was complete replacement and detailed fitting of the cockpit Perspex using basic moulds provided by Mosquito experts AvSpecs in New Zealand.

The aircraft had been kept as authentic as possible and where replacement parts have been needed, they have been made to original drawings using specification materials. The cockpit is fully equipped, including a Gee radio/navigation set, and various operative electrical systems including the landing lights, bomb release mechanism and some instrument lights. Although the pneumatic systems need some work, the bomb doors can be operated by air pressure.

This project represents the high level of motivation and skill of the museum volunteers who have taken great pride in what is an incredibly authentic restoration to the highest standards – all for the benefit of future generations.

People ask why the Mosquitos do not fly. The airframe's construction uses old wood and bonding techniques. As such, it would have to be practically destroyed to be rebuilt using flying standard materials – which would be very expensive and require the museum to be an original equipment manufacturer (OEM). With TA122 now a conservation project, the museum's next major restoration will be completing TA634.

Almost there: TA122 on a rare appearance outside during the latter stages of an epic restoration Bob Glasby

BLACK FRIDAY

February 9, 1945 was the darkest of days for the Royal Air Force's Coastal Command, as *FlyPast's* **Jamie Ewan** details…

One wonders what went through the minds of Flt Sgt R Priest and WO J Brightwell as they pushed open the throttles of their Bristol Beaufighter TF.Xs at RAF Dallachy – just east of Elgin in Scotland's Morayshire.

It's just before 0900hrs on February 9, 1945. Assigned to No 489 Squadron Royal New Zealand Air Force, it's clear to many, maybe even them, that German shipping was on its knees – it wasn't a question of *if*, but *when* it would be defeated. But they still had a job to. Coastal Command, which fell under the control of the Admiralty, had tasked them with a reconnaissance mission – intelligence had reported a destroyer moving north along Norway's western coast towards Trondheim was hiding somewhere in the Vevringe Fjord. As the pair pushed northeast over the North Sea towards Norway, behind them the Dallachy Strike Wing waited.

Crossing Norway's

weatherbeaten coastline about 50 miles northwest of Bergen at 1030hrs, they quickly spotted their first ship, "similar to R/ boat" to quote their original report. Continuing north, they passed through the tight entrance of the ice bound Førde Fjord, only to be greeted by the immense sight of a German Narvik-class destroyer, accompanied by several other ships, including a minesweeper and a pair of flak ships, taking shelter in the fjord's tight confines and towering peaks. It was the Z-33, one of last remaining warships flying German colours.

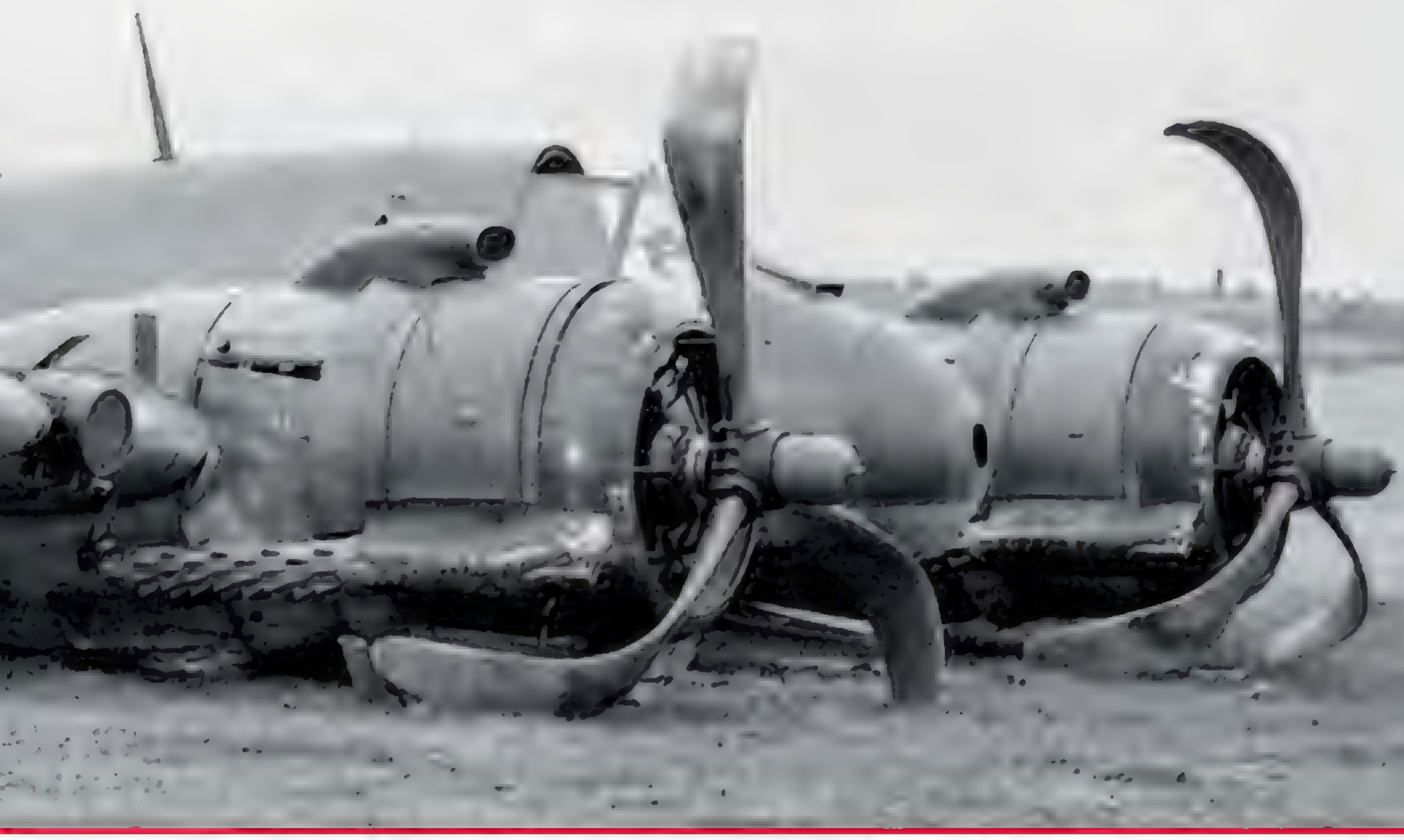
Despite encountering heavy fire, the 'Beaus' continued probing numerous fjords, before turning for home around 1120hrs. As they did, they signalled their findings back noting "no less than 5 transports in Nord-Gulen, the largest between 4,000-5,000 tons, very attractive targets indeed." Almost immediately, plans to attack began. While the merchant ships were both the obvious and worthwhile targets, the Admiralty had other ideas – they wanted the destroyer. With Priest and Brightwell landing back at Dallachy around 1324hrs, by the time they walked back to operations, the first of the attacking Beaufighters were snaking their way to the runway.

Prelude to hell

By late 1944 Allied victories across France and Eastern Europe had pretty much confined German shipping to the lower waters of the Baltic and Norway. This forced Germany to use its Norwegian ports (including Bergen in the south, Trondheim in Norway's central band, and Narvik in the north) to continue the Battle of the Atlantic, move troops, and conduct trade with neutral Sweden, its primary source for much-needed iron ore. This situation wasn't helped when the Baltic iced over during the winter of 1944-1945, forcing all the warring nation's imports to be shipped to Narvik. With

Above
Dallachy Strike Wing: A mix of early and late production Bristol Beaufighter TF.Xs await their next sorties at Dallachy shortly after the strike wing was established there in late 1944

"By the time they walked back to operations, the first of the attacking Beaufighters were snaking their way to the runway"



Left
'Wounded duck' – the wreck of Stan Butler's Beaufighter, NE831/PL-O, lies at Dallachy following the action of February 9, 1945 over the Førde Fjord. Lucky to survive their first anti-shipping strike, 13 of their colleagues never made it back
KEY Collection

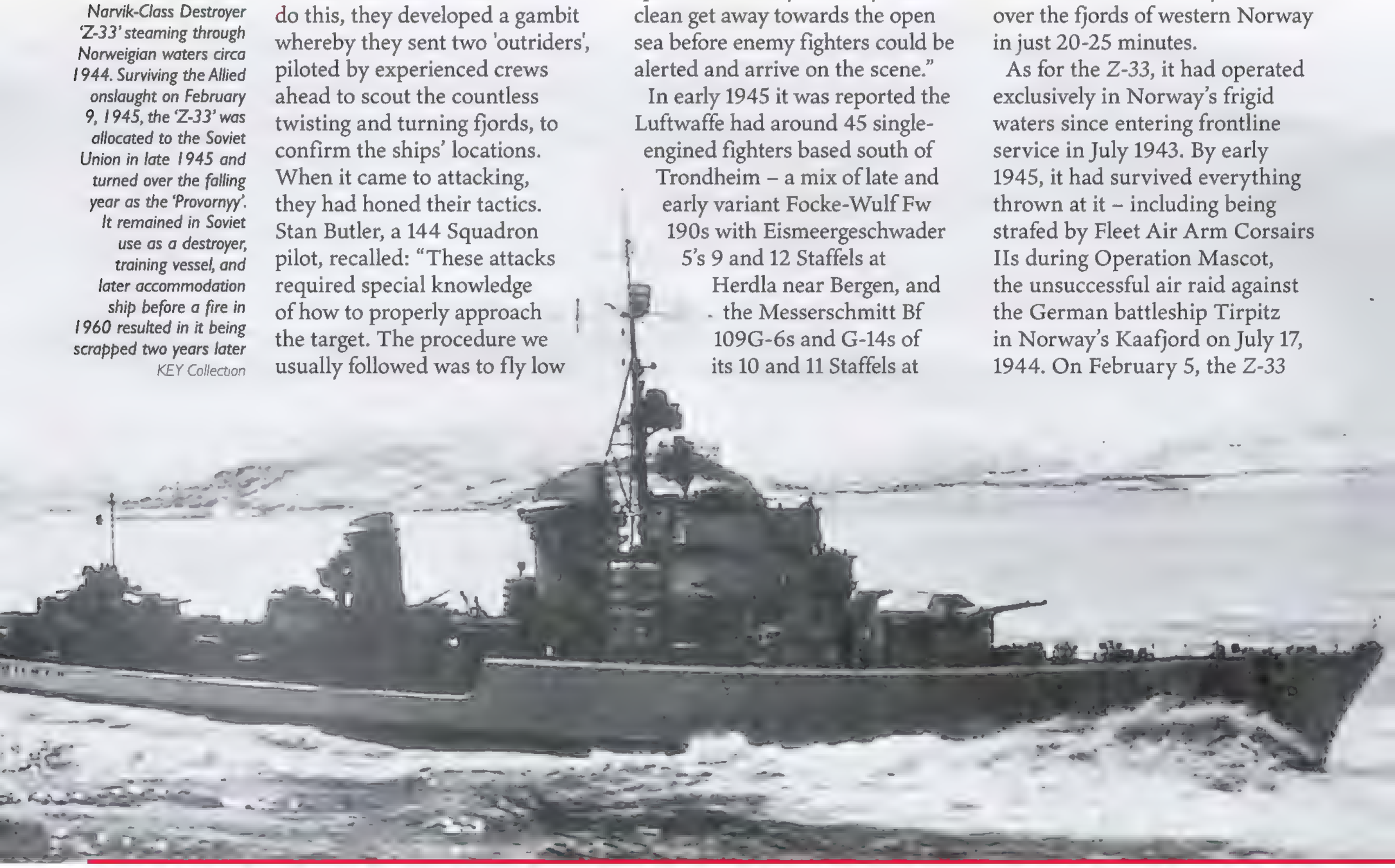
Right
August 25, 1944: This remarkable image of Beaufighters hitting a German M-Class Minesweeper off the Dutch coast captured by Fg Off Forbes Macintyre of No.455 Squadron reveals the truly chaotic nature of an anti-shipping strike. Now take this, and add the tight confines of a fjord, a near impossible to hit target, towering peaks, and enemy fighters – that's what the Dallachy Strike Wing faced on February 9, 1945…
Crown Copyright-Air Historical Branch

this increase in German shipping across Norwegian waters, Coastal Command transferred several anti-shipping squadrons to northern Scotland during September and October 1944 to counter them. With three de Havilland Mosquito fighter bomber squadrons (143, 235 and 248) sent to RAF Banff, about 35 miles to the west of Elgin, to form the Banff Strike Wing, four Beaufighter-equipped units arrived at Dallachy. Forming its namesake strike wing, it comprised 144 Squadron RAF, No.404 Squadron Royal Canadian Air Force, 455 Royal Australian Air Force Squadron, and the aforementioned 489 Squadron. Their appearance quickly forced German ships travelling the Norwegian coast to sail at night and seek shelter in deep fjords during the day. Coastal Command sent near daily patrols out along the Norwegian coastline from the Skagerrak to Trondheim – often resulting in wing-sized strikes in less-than-ideal weather. To do this, they developed a gambit whereby they sent two 'outriders', piloted by experienced crews ahead to scout the countless twisting and turning fjords, to confirm the ships' locations. When it came to attacking, they had honed their tactics. Stan Butler, a 144 Squadron pilot, recalled: "These attacks required special knowledge of how to properly approach the target. The procedure we usually followed was to fly low level to the Norwegian coastline, then climb just high enough to clear the coastal mountains and head toward the selected target area. We would then commence the attack in a 'V' formation in a direction, usually east to west toward the coast, that allowed us to break off after the attack and exit directly out of the fjord. By doing this we expected the element of surprise would allow the least amount of time being spent over enemy territory and a clean get away towards the open sea before enemy fighters could be alerted and arrive on the scene."

In early 1945 it was reported the Luftwaffe had around 45 single-engined fighters based south of Trondheim – a mix of late and early variant Focke-Wulf Fw 190s with Eismeergeschwader 5's 9 and 12 Staffels at Herdla near Bergen, and the Messerschmitt Bf 109G-6s and G-14s of its 10 and 11 Staffels at Gossen, about 160 miles further north. While this number barely matched the combined strength of the strike wings, many of the assigned pilots were battle-hardened veterans and aces from the Eastern Front – including Ofw Rudolf Artner and Lt Rudi Linz, who between them had already downed close to 100 allied aeroplanes. On February 9, 1945, Staffel 9 had nine aircraft sat at readiness, while 12 Staffel had three. If scrambled, they could be over the fjords of western Norway in just 20-25 minutes.

As for the Z-33, it had operated exclusively in Norway's frigid waters since entering frontline service in July 1943. By early 1945, it had survived everything thrown at it – including being strafed by Fleet Air Arm Corsairs IIs during Operation Mascot, the unsuccessful air raid against the German battleship Tirpitz in Norway's Kaafjord on July 17, 1944. On February 5, the Z-33

Below
A rare view of the Narvik-Class Destroyer 'Z-33' steaming through Norweigian waters circa 1944. Surviving the Allied onslaught on February 9, 1945, the 'Z-33' was allocated to the Soviet Union in late 1945 and turned over the falling year as the 'Provornyy'. It remained in Soviet use as a destroyer, training vessel, and later accommodation ship before a fire in 1960 resulted in it being scrapped two years later
KEY Collection



departed Trondheim bound for Germany. Two days later it ran aground in the shallow waters of Brufjord – the impact severely damaged the port propeller and shaft, knocked out both engines, and caused flooding. Although the crew managed to limp the vessel to Bergen that same day, they opted to return to Trondheim under the cover of darkness for repairs. Laying up in the Vevringe Fjord on the 8th, she entered the Førde Fjord early the following morning – taking up residence between Mula and Heilevang. Just after 1030hrs, the valley echoed to the snarl of Priest and Brightwells' Beaufighters. Despite heavy fire, the pair escaped unscathed. Familiar with the dangers of the Norwegian coast, the Germans knew exactly what the 'Beaus' were doing. They also knew it was just a matter of time before a strike would arrive.

Norwegian nightmare

Within minutes of getting the signal, Wg Cdr Jack Davenport at No 18 Group RAF headquarters in Dunfermline, began planning a strike against the Z-33. Having previously commanded 455 Squadron, he was a veteran of such strikes. With the plan on paper, he handed it to the Dallachy Strike Wing. In turn, it was passed to Wg Cdr Colin Milson – No.455's CO. A veteran of anti-shipping operations across the the Mediterranean and North Sea, the 25-year-old had reservations about what was likely to be a costly raid, especially as it was clear hostilities were coming to an end. Despite this, he selected his crews, while his navigator, Fg Off Ralph Jones (the oldest member of the strike force at 35) plotted their route.

As they did, 12 North American Mustang IIIs of 65 Squadron were prepared for fighter escort duties, while a pair of air-sea rescue Vickers Warwick Is from 279 Squadron at nearby Fraserburgh were readied – the latter were often the only chance aircrew ditching in the North Sea had of survival. Although 12 Mustangs launched, two quickly returned home, one with engine-trouble, the other escorting it.

Canadian Bert Ramsden, a pilot officer with 404 Squadron, recalled: "We heard scuttle that a German battleship had been observed along the coast and that a couple of Beaufighters had been sent out on a reconnaissance mission. Even before confirmation was received, preparations were being made for a raid that would involve fighter-bombers from several squadrons."

As the two 'outriders' got airborne from Dallachy, nine 'Beaus' from 144 Squadron armed with four nose-mounted 20mm Hispano Mark II cannon and six wing mounted 0.303 Browning machine guns (four starboard, two port), and 11 from both 404 and 455 Squadrons boasting the same canon fit plus eight 60lb RP-3 rockets, soon followed. All were armed with a rearward facing Browning operated by the navigator for self-defence. The crews nicknamed these the 'pop gun'.

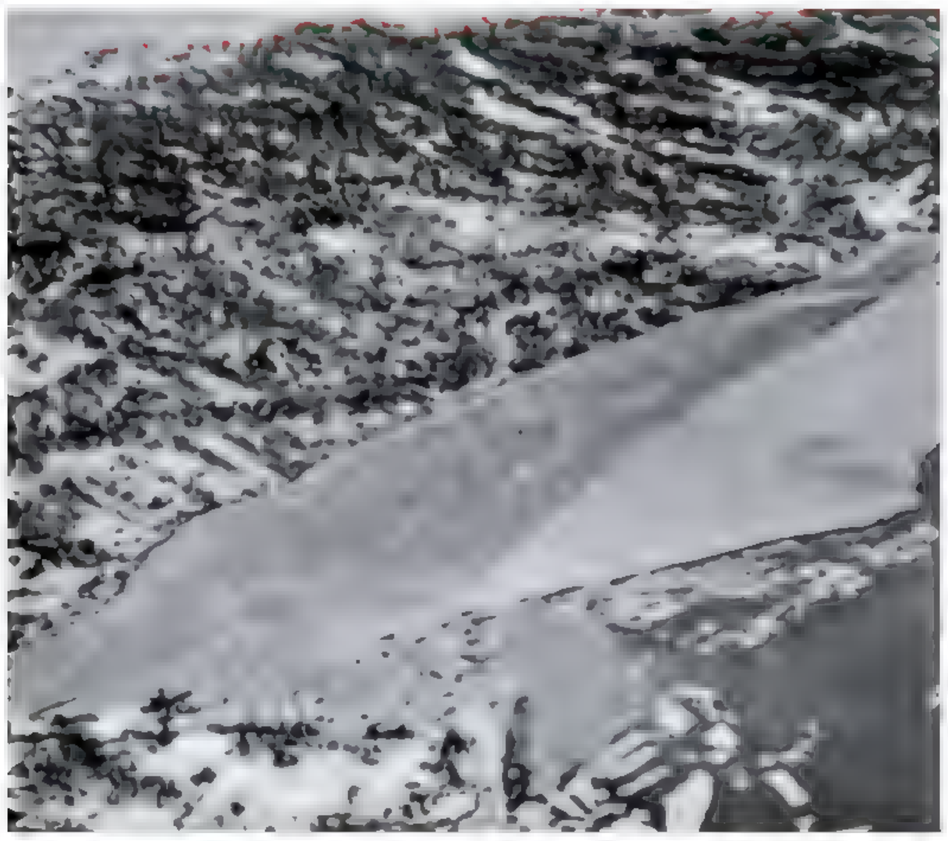
For Stan Butler and his navigator Flt Sgt 'Nick' Nicholl in NE831/PL-O it was their first anti-shipping strike. He remembered: "Take-off was just before 1400hrs; we formed up and set course at low level in loose formation 'vics' of three. The weather was not bad; there were rain squalls here and there, but visibility was reasonably good. Everything was going according to plan." With the 'outriders' hitting the Norwegian coast west of Sognefjord, they crossed the Førde Fjord close to where the German ships were sighted that morning – but they were nowhere to be seen.

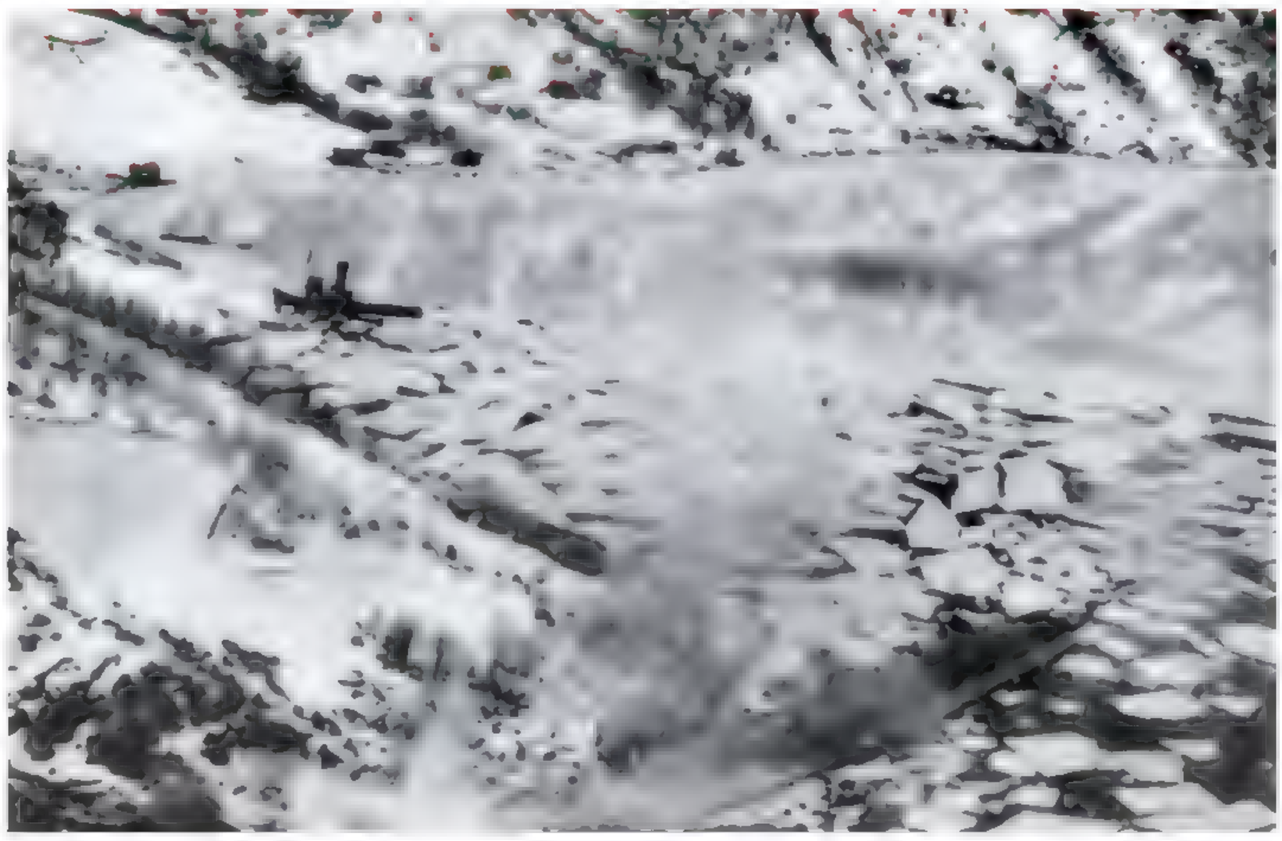
The Z-33's commander, Fregattenkapitän Rudolf Menge, opted to move further into the fjord. While several of the vessels took cover in a natural cove near Bjørkeda on the south, the

Far left
Australian Wg Cdr Jack Davenport was instrumental in initiating the plan to attack the 'Z-33'. Having previously commanded No.455 Squadron, he was a veteran of such strikes. The month before what became known as 'Black Friday', Davenport was awarded the George Medal for outstanding bravery in rescuing the pilot from the blazing cockpit of his Beaufighter after it had crash landed at RAF Langham in Norfolk
Alamy Stock Photo-piemags-ww2archive

Above left
Wing Commander Colin Milson was just 25 years old when he led the Dallachy Strike Wing against the German destroyer 'Z-33' on February 9, 1945
Alamy Stock Photo-piemags-ww2archive

Below
Armourers load RP-3s onto the wing rails of a 144 Squadron Bristol Beaufighter TF.X at Dallachy. Boasting a 60lb semi armour-piercing high-explosive warhead, this gave rise to the alternative name of the "60-pound rocket"
Alamy Stock Photo-piemags-ww2archive





Above
This wide-angle view of the Førde Fjord on February 9, 1945 reveals the tight confines and towered peaks the Dallachy Strike Wing faced during their assault. The 'Z-33' can be seen anchored among the broken ice towards the bottom of the image
Alamy Stock Photo-History and Art Collection

Above right
This image captured from a No.455 Squadron RAAF machine shows the 'Z-33' under attack on February 9, 1945. Eyewitnesses recalled the ship "rocked and shaked" under the onslaught of fire from the Dallachy Beaufighters
Alamy Stock Photo-History and Art Collection

Right
Personell from No. 404 Squadron RCAF pose with a Beaufighter while operating out of RAF Strubby, Lincolnshire. as part of its namesake strike wing during the summer of 1944. Ten of the men seen here were assigned to the strike against the 'Z-33'
Department of National Defence Royal Canadian Air Force

Z-33 and a flak ship anchored themselves near Frammarsvik on the south side. Three more flak ships – some of which were trawlers converted for anti-aircraft (AA) duties – positioned themselves between them. Surrounded by near vertical peaks barely a mile across at its widest point, it would be difficult to spot the ships, let alone attack them. To make matters worse, the weathered peaks and shoreline housed several AA gun batteries.

Turning east, the 'outriders' growled over the town of Førde itself, before prowling the neighbouring fjords north to south looking for any sign of the prized warship – it was still nowhere to be seen. Although they spotted a German fighter to the north and a small convoy to the south, there was no trace of the destroyer. Unbeknown to them, they had flown directly over it several times. By the time they radioed Milson at 1550hrs to report they couldn't find the ship, the Fw 190s were scrambling from Herdla. With Artner taking the lead with 9 Staffel, 12 Staffel's fighters climbed above them to provide top cover. The Dallachy Strike Wing was flying into a nightmare scenario.

Into hell

With the 'outriders' job done, they turned for home. At the front of the main strike force, Milson had a hunch the destroyer was still in Førde Fjord. Pressing on from the south, the 25-year-old led them over the village of Bygstad – just eight miles from the target fjord. If the destroyer was still anchored at Heilevang, they could attack from the east, continue west through the fjord to escape into the relative safety of the North Sea. His watch showed it was just past 1600hrs. Butler recalled: "As we turned north with the intention of turning west into the fjord when we reached it, and making our attack 'out to sea', we suddenly found ourselves under fire from the ships... they were almost underneath us!"

Caught completely unaware as the sky erupted around them, Milson had no other choice but to reposition – abandoning the attack wasn't an option. But on seeing the target, it was clear they had been expecting them and had anchored themselves in the most advantageous position. They would need to head further east to make the attack, if they were to run the fjord to escape. Turning east, Wilson then led the strike force south towards Førde and then west to a position just south of the fjord. Looking to the west, he soon realised that to have any chance of success, an attack out of the fjord was virtually impossible. They would have to continue west, before turning 180° to run into the fjord.

According to 404 Squadron's records: "...the strike wing was not prepared to attack, and the

formation leader orbited the force twice to get into a suitable attack position and then ordered the attack up fjord. As [they] made their way in, they met an intense crossfire in the form of a box barrage."

With Milson attacking first, it was clear to those behind that there wasn't enough room in the fjord for more than two or three 'Beaus' at the same time. Subsequently, they were queueing to make their runs. Despite heavy fire, the Beaufighters singled out their targets. According to one eyewitness: "it seemed to us it was the boats in the middle of the fjord [that] got the worst of it". Realising there was a bottleneck, some of the attacking pilots opted to come from the southwest, others from a more westerly direction – the latter using cannon and rockets against the *Z-33*. If not hit, there were certainly near-misses as it "rocked and shaked".

As the battle raged on, Beaufighter after Beaufighter dived into the hell below. Butler: "All this manoeuvring had taken an awfully long time. A long enough time, in fact, for enemy fighters to appear." At around 1610hrs, Plt Offs Percival Smith and Frederick 'Spike' Holly tipped in for their attack. One of 144's most experienced crews with 35 operations, this was to be their last. Diving into the fjord, Smith noticed eight dots approaching from the southwest – "Mustangs?" he mused.

Successful in their attack and evading the ships, they screamed west through the fjord to escape, while Holly surveyed the chaos behind him – as he did, he spied a fighter bearing down on them. Thinking, maybe wishing, it was a Mustang, his hopes were shattered when he saw its guns flicker. Alerting Smith over the intercom, cannon shells smashed into the cockpit and port engine. While Holly was wounded and knocked unconscious, Smith miraculously survived unscathed. Pushing his battered machine below the treetops he headed west across Naustdal. Struggling for control, he knew a forced landing was their only option. But where? This part of Norway wasn't known for being flat! Continuing west, he finally eased the machine into the ice packed waters near Høydalsfjorden – about 20 miles northwest of Førde Fjord. Quickly rescued by nearby townspeople, both men were soon captured. Seeing out the rest of the conflict as prisoners of war (POWs), Smith passed away aged 78 in December 1996, while Holly died in April 2005, aged 84.

As Smith and Holly escaped their Beau, a Mustang snarled overhead being chased by a pair of Fw 190s. Suddenly diving into the valley, the Mustang appeared again below one of the '190s. Firing a short burst, it was a certain 'kill', the German fighter flicking over and crashing in a ball of flames near Solheimsstolen. The pilot was Lt Rudi Linz in his usual machine – Fw 190A-8 'Blue 4' bearing his swathes of Allied 'kills' on the rudder and his wife's name, Gretel, under the cockpit. Likely dead before he crashed, he was just 27 years old.

Despite an onslaught of AA fire, 9 Staffel dove directly into the waiting Beaufighters. Ramsden: "After forming up, Milson and his formation began the attack. I was assigned to one of the following formations and due to the narrow attack area, we had to wait in a holding pattern for our turn. It was during the first attack that someone reported a small formation of planes coming from the south. Below, we could also see the German gunners must have been very experienced as they laid down a very effective blanket of flak along our approach run. A few minutes later our group commenced [its] run, but the radio chatter made it clear that at least one squadron of Luftwaffe fighters had arrived and was attacking the waiting bombers. This was very bad news as we were now more or less trapped at low level in a very narrow fjord with heavy flak coming up from below and German fighters from above. We knew our waiting bombers would be vulnerable. As usual, following our run, we were ordered to break off and head for home. As our wing guns had been replaced

"Out of the corners of my eyes, I was fascinated to see the props stop – the starboard first, and then... wallop – we hit the deck"

Below
One of the flak ships – likely a fishing trawler converted for anti-aircraft duties – accompanying the 'Z-33' bears the brunt of a Beau attack on February 9 1945
Alamy Stock Photo: History and Art Collection

Right
The ferocity of a Beaufighter attack is evident in this view of the German flak ship 'Mosel' under fire from aircraft from No.404 Squadron machines off the coast of Norway on October 15, 1944. The Beaufighter visible on the right is NV422/EE-C, which was lost with its crew (Fg Offs Hugh Lynch and Oswald Knight) during the attack on the 'Z-33'
Alamy Stock Photo-piemags-ww2archive

"Despite knowing their Beaufighters were no match for the Fw 190s, the Dallachy Wing threw themselves into the battle"

with rockets, we had no means of effectively fighting the Luftwaffe."

Artner later wrote: "About 50km north of Sognefjord, we saw the enemy formation which consisted of approximately 30 Beaufighters and 10 Mustang escort fighters. During a combined attack with my Staffel, I managed to gain hits on a Beaufighter, which I attacked from behind and above. The Beaufighter crashed burning in a flat angle. The crash was noted at 1610hrs about 10km northwest of Førde. The crew did not leave the plane."

Possibly the first casualty of the day, it is thought this was 404 Squadron's NT922/EE-V crewed by Canadian Plt Offs William Jackson, 27, and his navigator William Blunderfield – aged just 22. Both were killed. Within minutes, another four of the unit's Beaufighters had fallen, including NT890/EE-F with Fg Offs Charles Smerneos (24) and Norman Cochrane (25), NE761/EE-W with Fg Off Philip Myrick (22) and Plt Off Claude Berges (27), and RD136/EO-Q1 with Fg Off Harry Smook (20) and Plt Off Alan Duckworth (23). They were all killed.

Artner gained his second claim of the day not far from where Linz fell – barely three minutes after the first. It was his 19th 'kill'. Of it, he wrote: "I managed to hit another Beaufighter twice during a low-level chase. The plane finally turned and crashed straight into the ground after yet another salvo. The crash was noted at 1613hrs about 5km north-northwest of Naustdal."

It's not known which Beaufighter this was – but 455 Squadron also lost two aircraft that day: NV199/UB-O, crewed by Flt Lt Robert McColl and WO Arthur MacDonald who survived to become POWs, and NV196/UB-V crewed by WO Donald Mutimer and Plt Off John Blackshaw – both were killed. Like many of the Beaufighters lost that day, the precise cause may never be established. It's a similar story for one seen to crash into a swamp and burst into flames near Naustdol. Although locals tried in vain to save the crew, their efforts were beaten by the intense heat and exploding ammunition. This may have been one of the crews from 404 Squadron, locals reportedly hearing German soldiers saying "Arme Kanadier".

They fell in all directions...

Leading in Mustang KH788/YQ-T, Flt Lt Jonnie Foster spotted the swarm of German fighters. Watching as they pounced on the unsuspecting Beaufighters orbiting Vevring, Foster alerted the others. As he did so, the Fw 190s of 12 Staffel appeared heading directly for him. Managing to fire a short burst at one before diving away, he saw several hits around its engine before it spewed a trail of black smoke. Later identified as Lt Karl-Heinz 'Charly' Koch's Fw 190A-8 'Blue 9', the five-victory ace escaped the stricken machine just before it crashed into the sea near Heilevang.

Another Mustang claimed Fj Ofw Otto Leibfried's Fw 190 ('White 22', an F-8 fighter-bomber) near Gjesneset – the pilot noting "hits in the cockpit, wings, and engine" before it was "engulfed in flames". Although wounded, Leibfried managed to bail out, but landed in the

treacherous terrain of the nearby peaks. It was reported that "in the nights following the battle, people could see his flares calling for assistance, but there was little the Norwegian or German patrols could do." His body was found later that year.

As the battle developed into a whirling maelstrom of Fw 190s, Mustangs, and Beaufighters, aircraft fell in all directions. Near Gaular, residents saw an Fw 190 ('White 1' piloted by Uffz Heinz Orlowski) chase down a 'Beau'. Hit several times, the pilot attempted to crash land, but the rising terrain made it impossible. Hitting the hillside with a sickening crash, horrified witnesses saw the Beaufighter "break in half" and "the cockpit-section slide down the hillside". Later identified as No 404's NV422/EE-C flown by Fg Offs Hugh Lynch and Oswald Knight, both men were killed. Aged 24 and 27, they had joined the squadron just three weeks before. This was their first strike.

Seeing that Beaufighter in trouble, WO Cecil Caesar gave chase in Mustang HB836/YT-N. Pursuing the German fighter, a low-level duel developed. Suddenly catching fire, the Mustang entered a wide turn. It will never be known what happened in the cockpit of the American-built fighter – to some it looked like Caesar was trying to get away, to others he was trying to crash land. Despite his aeroplane burning fiercely, he never attempted to bail out. Instead, he turned back into the fight, before "ploughing" into the pine forest below like a "burning torch". The sole Mustang lost, Caesar was killed. But it wasn't in vain – Orlowski was forced to bail out moments later, his Fw 190's engine had been damaged during the skirmish. Escaping from the cockpit at very low level, he was too close to the ground for his 'chute to open. Crashing into the snow-clad hillside, he miraculously survived, unhurt. Incredibly, his only injuries were sustained when a small avalanche carried him down the valley – his flare gun went off resulting in severe burns on one leg. He spent the rest of the war convalescing.

Fighting back

Despite knowing their Beaufighters were no match for the Fw 190s, the Dallachy Wing threw themselves into the battle – including Fg Off J Nelson and WO R Gracie of 404 Squadron in NT916/EO-S. Seeing a 'Beau' being hounded by a pair of '190s, they gave chase, shooting one down. With the other turning into them, Gracie managed to hit it with a burst from his 'pop gun'. It quickly flew away. For "driving a 190 off a comrade's tail" Nelson was awarded the DFC. Another 'Beau' (NE686/EO-T, crewed by Fg Off H Flynn and Plt Off M Michael) engaged a pair of '190s, but lost them in the whirling mass of aeroplanes. It's hard to imagine the scenes in the Beaufighters as the crews fought to survive while trying to avoid each other, the anti-aircraft fire, enemy fighters, and the valley walls. They nevertheless continued to press home their attacks, seemingly with disregard to the immense peril. One witness recalled watching gunners on the ships fall under the return fire from the Beaufighters, only to be replaced by new ones – such was the intensity of the battle.

Spotting the Z-33 among the melee, Flynn unleashed his rockets. He was credited with two RP strikes. On his right wing was NT922/EE-V with William Jackson and William Blunderfield who were lost moments later – it's not known if they hit their intended target. Flynn's 'number 2' was Canadian Fg Off Roger Savard and his navigator Plt Off Jeffery Middleton in NV292/EE-O. Both men were approaching the end of their tour. Diving through the onslaught, their Beaufighter was peppered by AA fire – severely injuring Middleton. Their aircraft ablaze, Savard successfully crash landed on the ice. Although they survived the initial impact, NV292 flipped onto its back – trapping both. With Norwegian civilians rushing to help them, they were soon forced to retreat when German soldiers fired on them. Witnesses later saw both being freed by German flak crews, but by then Middleton, 30, had succumbed to his wounds. Savard spent the rest of the war as a prisoner.

"Weave, for Christ's sake!"

The last Beaufighter to attack was Stan Butler's. Seeing two smaller vessels, he lined up on the one that was "easiest to get at". He recalled: "We got in quite a long burst, bang on target. Hypnotising for a first timer, so hypnotising that there was a danger of not pulling out of your dive in time! We flattened out. Nick saw a ship's mast flash past and then, on our port, the destroyer tucked close into the fjord wall. It seemed to be only yards away and was giving us a continuous broadside with everything it had as we jinked along its length. Being last into the attack, and probably their only remaining target, we were getting plenty of unwelcome attention. It was a frightening moment."

Below
Uffz Heinz Orlowski was one of the pilots from Eismeergeschwader 5's 9 Staffel scrambling from Herdla on February 9 1945. Piloting Fw 190F-8 'White 1' he was forced to bail out following a low-level duel with 65 Squadron's WO Cecil Caesar – the latter's final act of war. By the time Orlowski escaped his battered machine, Caesar was dead
Public Domain Image

Above
Incredibly, Orlowski's Fw 190F-8 'White 1' (Werk Nummer 931862) was salvaged in September 1983 and has since been restored to flying condition as N91FW by GossHawk Unlimited in in Arizona for its owner – the Massachusetts-based Collings Foundation. It is seen here undertakings its first engine run on January 31, 2023 – almost 78 years to the day the former Luftwaffe fighter was shot down over Norway. In 2005 Orlowski visited it and sat in his fighter once more. He died in 2010
GossHawk Unlimited-Lindsey Goss

While trying to escape the inferno, a small calibre round smashed into the cockpit. Miraculously, both men were unhurt – but it destroyed a distribution manifold in the hydraulic system at the base of Butler's control column. Manoeuvring wildly to spoil the AA gunners aim, hydraulic fluid splashed over them and the canopy – killing their visibility. Suddenly, Nicholl discovered "the unmistakable front silhouette of an Fw 190 with little lights sparkling along its wings". Shouting "Weave, for Christ's sake! Weave, weave!" as a burst of tracer flashed by, Butler threw the 'Beau' around the sky. With Nicholl firing a red Very flare to alert the fighter escort, a Mustang soon chased off the offending Focke-Wulf as they continued into the Førde Fjord looking for somewhere to escape its cavernous walls, the rugged ridgeline hiding in the clouds above them.

Although damaged, their aircraft was still flying – and they were still alive. Behind them, burning wreckage marked the spots where men, many younger than the author is now, lost their lives. Setting course for home, they negotiated the North Sea, before Dallachy appeared in front of them – a sight to behold. Unaware of the true extent of their damage, they opted for a wheels-up landing. Butler said: "Out of the corners of my eyes, I was fascinated to see the props stop – the starboard first, and then... wallop – we hit the deck. I vividly recall pressing hard on the brakes, but I had no wheels!" Another 'Beau' landing wheels up at Dallachy was 455 Squadron's NE798/UB-Q piloted by Fg Off C Thompson and his navigator WO I Gordon.

With almost 50 aeroplanes involved, the battle over the Førde Fjord was, and still is, the largest air combat ever to have taken place over Norway. The entire battle was over by 1630hrs – less than 15 minutes after it had started. With the surviving Beaufighter crews breaking for home, many of them injured and fighting to keep their damaged aeroplanes in the air, the Fw 190s landed at Herdla at 1655hrs – barely an hour after scrambling. The last Beaufighter landed at Dallachy at 1845hrs. That aircraft was No 455's NV450/UB-X piloted by Fg Off H Spink and his navigator Fg Off O L Clifford. Despite both crew being wounded, Spink severely, the pair had managed to limp home. There, they made a wheels-up landing in the dark – an incredible feat in view of the damage to both them and their aircraft. Both received the DFC. Although they waited for more to arrive, they knew the effort was in vain.

One of those watching them return was Andrew Hendrie. Then stationed at Dallachy, he later went on to author numerous books on the efforts, struggles, and sacrifices of Coastal Command during World War Two. He recalled: "They landed like a flight of wounded ducks... a number just pancaking. It was like a Hollywood film set – but this was real. Later in the mess I saw some of the Beaufighter aircrew with their clothing truly in ribbons."

Of the 31 Beaufighters despatched, eight were lost – killing 13 men, the other five becoming POWs. Six of those lost belonged to 404 Squadron. Hendrie added: "In the mess about that time, I heard broadcast Elgar's 'Chanson de Matin', music ever to recall in my mind 404 Squadron's 'Black Friday'." In his logbook entry Ramsden wrote: "Black Friday. 6 of 11 lost" alongside a sombre list of their nicknames. In the unit's Operations Record Book for February 9, 1945, the adjutant, Flt Lt 'Wilkie' Wilkinson penned: "Today's losses were a staggering blow, and a keen sense of personal loss is felt by every member of the squadron and the servicing echelon."

As for the *Z-33* and its escort, the damage was classed as light – despite the destroyer suffering an explosion following a successful hit by Flt Lt J Powers of 144 Squadron, and a minesweeper being set alight. With none of the ships sunk, Costal Command's darkest day was made that bit worse when it was revealed that ULTRA - British military intelligence – was already aware that the *Z-33* was located where she was. Such is the way of war.

Right
Today, the remnants of the BMW 801 engine belonging to Lt Rudi Linz's Fw 190-A8 'Blue 4' (Werk Nummer 732183) survives in the Luftkampmuseet (Air Battle Museum) at Naustdal – just 3 miles or so from where the 'Z-33' was anchored that fateful day
Alamy Stock Photo-Peter Holly

A Star is Born

Few aircraft types have had such a lasting impact on the progress of aviation as the iconic Douglas DC-3 and C-47 family. **Malcolm V Lowe** delves into the story of this world famous civil and military transport

Where it all began. The very first Douglas Commercial was the sole DC-1 NC223Y. It proudly wore TWA colours and proved the DC concept, which was refined firstly as the DC-2 and then as the DC-3/C-47 family All Malcolm V Lowe Collection unless noted

December 17, 1935, was to become a significant marker in the history of flying machines. Taking to the air that day was the first of what became an extraordinary line of twin-engined transport aircraft in many versions, which collectively have left an indelible imprint on aviation worldwide during the past 85 years. Officially called the Douglas Sleeper Transport (DST), this first example established the basic shape and layout for the thousands of airframes to follow, in a wide variety of different versions for many different civil and military roles.

Advanced designs

The Douglas Commercial (DC) series of outstandingly successful airliners began due to a pressing requirement. In the early 1930s, flying the mail was one of the few ways for airlines to stay in business, but as the economy of the US improved following the economic crisis of 1929, the airline industry began to pick up. Aviation design and technology was advancing rapidly throughout the 1930s, leaving behind antiquated biplanes and ushering in the era of the streamlined, fast and powerful monoplane.

The airlines required better and more modern types to replace the ageing, often dangerous, and generally unprofitable passenger carrying biplane. The US aviation manufacturers Boeing and Douglas were ready to answer this clarion call. With the twin-engined Model 247 airliner, Boeing created a clean modern-looking design, with advanced features that included all-metal construction, monoplane layout, an enclosed cockpit and passenger cabin, and a retractable main undercarriage. Boeing was a leader with this type of configuration, having designed and built the single-engined Monomail transport/mail carrier and YB-9 twin-engined bomber. The first Model 247 flew on February 8, 1933, and it became a principal type with United Airlines (written at the time as United Air Lines – UAL – the successor to Boeing Air Transport).

Douglas' response was the DC-1. Although in the event just a single DC-1 was produced, with the US civil registration NC223Y, this initial Douglas Commercial was the first of the phenomenal line of successful commercial aircraft Douglas was to produce during the coming decades.

The DC-1 first flew on July 1, 1933, with test pilot Carl Cover at the controls. A beautifully streamlined twin-engined monoplane with much more attractive lines than Boeing's Model 247, the aircraft was welcomed with enthusiasm by TWA, in whose colours it flew. Basically a 12-seater (to rival the ten seats of its Boeing competition), the DC-1 was accepted by TWA during late 1933

Above
The DC-2 first served militarily with the USAAC as the C-33 (Model DC-2-145). Something of a hybrid, this mark was specifically for cargo-carrying, and had the vertical tail surfaces of the DC-3. Seen here is 36-72, the third production example

with a few initial modifications. Suitably impressed, the airline subsequently ordered 20 examples of the developed 14-seat production derivative, designated Douglas DC-2.

The new transport was an immediate success. It was flown not just by TWA, but also American Airlines and various other operators. Among several headline-making achievements, the DC-2 PH-AJU of Dutch airline KLM competed in the October 1934 MacRobertson Air Race between London and Melbourne in Australia. It finished an outstanding second, only bettered by a famous purpose-built specialist racer, the de Havilland DH.88 Grosvenor House.

Growth potential

It was clear that the excellent design of the DC-1/DC-2 had considerable merit, but that more could be done with the basic layout. The fuselage sides of these initial Douglas Commercials were essentially flat, meaning the fuselage itself could be widened to give more internal capacity. In response to customer suggestions, principally from American Airlines, Douglas' design team revised the DC-2 fuselage configuration, basically by 'rounding-out' the flat fuselage sides to give a virtually circular cross-section. By this simple stroke of genius, the legendary DC-3 was born.

With its big, visibly circular fuselage and two powerful radial engines, the new type looked purposeful from the first. In a twist to the tale, however, the very first example of this new DC airliner was laid out with an interior design that appeared to possibly deliver the best arrangement for its initial purchaser.

The original DST format that first flew during December 1935 offered sleeping berths for its passengers, with an array of small windows above the established main fuselage window arrangement. Standard sleeper accommodation for long-distance night flights was for up to 16 passengers, but this layout was in theory convertible to carry up to 24 daytime passengers. The DST entered service in the first half of 1936, Douglas having been encouraged to go ahead with the re-design of the DC-2 layout on the promise of orders from American Airlines. Although the sleeper layout was a success, the potential of the type as a pure passenger airliner was obvious from the start, and significant orders began arriving for Douglas to build this variation. The DC-3 therefore 'took-off' in almost breathtaking fashion, propelling Douglas to being one of the world's most important builders of modern, successful commercial aircraft.

It was American Airlines that had the accolade of inaugurating passenger services during June 1936.

The DC-3 was soon realised to be a reliable, fast transport with excellent range, and it carried passengers in greater comfort than had been known before; it left the Boeing Model 247 miles behind.

Prior to the start of World War Two, it pioneered many new air travel routes, and made those existing much more commercially viable. Significantly, it was able to cross the continental US from New York to Los Angeles in some 18 hours and with just three stops. That represented a massive step forward for the later 1930s, and it totally replaced any lingering survivors from the then-antiquated biplane passenger aircraft era. A further important but often overlooked fact is that the DC-3 was one of the first airliners that could profitably carry passengers alone, without relying on mail subsidies. In that sense it truly represented the emergence of US airlines from the dark days of the economic depression that had commenced during 1929. The type also received significant export orders from countries world-wide, such was the interest this increasingly successful and popular airliner was able to create. In the event,

Right
Ninth Air Force Skytrains participated in the D-Day fighting and many other operations. These C-47As wearing 'invasion stripes' belonged to the 81st Troop Carrier Squadron of the 436th Troop Carrier Group, which also took part in the southern France landings USAAF

the DC-3 was built in several specific versions at Douglas' Santa Monica plant, largely to suit customer preference, although Douglas continued to refine the basic design with various improvements as the type became more successful. Passenger access on these early models was made using a door in the starboard fuselage near the tail, but this arrangement was eventually changed to the port side.

Significant among the major versions was the DC-3A, which introduced the 1,200hp Pratt & Whitney R-1830 Twin Wasp radial engine to the DC-3 line – a move that proved highly important when the type 'donned uniform' and became a pivotal military transport. Prior to that, the Wright R-1820 Cyclone had been preferred for the DC line, but the Twin Wasp proved to be an excellent engine type for the DC-3.

Civil DC-3 production ended not long after the US entry into World War Two. It is generally accepted that 607 examples were completed from this initial era of the DC-3 story.

Camouflage colours

Even by that time, the DC-3 had been transformed into a military transport, the role for which it is best remembered today. Indeed, the DC line had already experienced considerable military application prior to this due to the DC-2 having been put into action by the then-US Army Air Corps (USAAC). This service used the DC-2 in a variety of versions, notably the C-33 and C-39 transports. Among the first military versions of the DC-2 was also the R2D-1 for the US Navy, this type of course being shore based.

At the start of World War Two the DC-3 was the only tried and tested US transport aircraft available in mass production – and therefore potentially available in large numbers. The USAAC embraced the type immediately, and the DC-3 became best known forever after under the US military

"During the summer of 1941, the C-47 immediately became the new command's primary transport"

designation C-47. In fact, there were two main types of military transport based on the DC-3 layout, the C-47 Skytrain and C-53 Skytrooper. The initial C-47 (Model DC-3A-360) was followed on the Douglas production lines by the C-47A (Model DC-3A-456), which introduced a 24v (in place of a 12v) electrical system, and had numerous changes compared to the civil DC-3. The well-appointed cabin interiors of the civil models were not present in the C-47 line, which naturally had a much more austere internal layout. The floor was strengthened for the carriage of up to some 27 fully equipped troops, paratroopers or around 10,000lb of military cargo including ammunition, parts, general supplies, or even a Jeep. A large cargo door was fitted in the port fuselage side (with its own smaller entrance door), a hoist attachment was available, an astrodome for the cabin roof was introduced, and many examples had a slightly shortened tail cone for a glider towing attachment. Indeed, towing gliders became an important new role for the C-47 during its service life in World War Two. The more powerful C-47B (Model DC-3A-467) introduced several improvements, including superchargers for increased altitude 'hot and high' operation.

A new Douglas factory at Long Beach, California was utilised for C-47 production, additional to an operation set up at Oklahoma City (the location was in fact near Tulsa). Alongside the basic troop/paratroop/glider-towing configurations were many different specialist examples, including photographic survey, training, VIP transport and weather recce, to name but a few. Some aircraft acted in the casualty evacuation role or for carrying medical supplies. The type was truly versatile.

The specialized C-53 Skytrooper, which was intended primarily as a troop transport for up to 28 fully equipped soldiers, began production during the second half of 1941 at Douglas' Santa Monica plant. Visibly it lacked the cargo door and hoist attachment of the C-47. Around 400 examples were produced, the far more numerous C-47 line being far more versatile and useful. The US Navy also operated the C-47 in significant numbers. These machines were of course shore based, the C-47 derivatives being designated R4D under the rather ponderous naval classification system. However, they received the C-47 moniker during 1962 when all US military aviation type designations were standardised. The US Navy employed its R4D in various sub-types for training, liaison, VIP

Above
A significant customer for the DC-3 was American Airlines. Its influence in the type was considerable. Here, DC-3-277B NC21795 'Flagship Massachusetts' cruises serenely above a snow-covered landscape
American Airlines

Above Officially released in December 1944 although probably taken before then, this photo demonstrates that a Dakota could accommodate a Jeep internally. However, getting the vehicle in and out could be challenging KEY Collection

transport and an assortment of related second-line duties, including use in Antarctica. The Naval Air Transport Service, founded in late 1941 made good use of it too.

Military production

The C-41 was the first DC-3 derivative to be ordered by the USAAC, although it was something of a hybrid with the DC-2 and was a specialised command transport. The C-41A was a single VIP aircraft supplied to the USAAC during 1939. The USAAC was transformed into the US Army Air Force(s) (USAAF) during the summer of 1941, and the C-47 immediately became the new command's primary transport.

The initial examples of the basic C-47 model were ordered under 1941 Fiscal Year funding, the very first aircraft being serial number 41-7722. It was part of an initial order that included up to 545 examples –a colossal number for its time compared to meagre pre-war contracts.

Below Initially the 'round fuselage' development of the DC-2 was the Douglas Sleeper Transport, the close relative of the standard, passenger-carrying DC-3. This example was a DST-A-207B, painted in United Airlines livery

Eventually, according to Douglas' published figures, 965 C-47s were contracted, with 5,254 C-47A serial numbers allocated and 3,364 C-47B manufactured. There was even a one-off glider conversion with engines removed and designated XCG-17. In addition, some civil DC-2s and DC-3s were 'impressed' into military service during the war. The DC-3/DST impressments were designated C-48 to C-52, C-68 and C-84.

From the start, the C-47 was hugely successful in military colours. Nevertheless, it was comparatively slow to enter service due to the creation of the new Douglas production lines. Eventually, the C-47 operated in every theatre of war where the US military was in action. By 1944, Skytrains were well established in USAAF service worldwide, and had proved their worth throughout campaigns in the Far East, Pacific, North Africa and the Mediterranean.

One of the first major actions for USAAF C-47s was the Operation Torch landings in North Africa during November 1942. It was to be in northern Europe, however, that the type really gained its thoroughly deserved reputation. Without doubt, it can reasonably be said that the D-Day invasion of occupied France in June 1944 could not have succeeded without the C-47. The type was the first in action at the sharp end, dropping paratroopers and delivering gliders containing airborne soldiers and supplies in the early hours of the invasion.

It was truly a vital component of the massive Allied operations at that momentous time. Other campaigns such the Arnhem landings in September 1944, support for beleaguered Allied forces during the so-called Battle of the Bulge during late 1944, and the Rhine Crossing (Operation Varsity) of March 1945 all featured a significant contribution by the C-47.

Post-war reality

The usefulness of the Skytrain did not cease with the end of World War Two. Indeed, production of the original civil DC-3 was restarted as the DC-3D, using parts left over from wartime contracts when production was run down due to the end of the hostilities. Two further major military versions of the DC3/C-47 line were constructed following war's end, the Super DC-3 and C-117. The former product was launched in the late 1940s as a larger, and more powerful DC-3. It had a lengthened fuselage, squared-off wingtips, revised vertical tail surfaces and more powerful radial engines, either Wright R-1820 Cyclones or the Pratt & Whitney R-2000. However, by then the civilian market was flooded with second-hand military C-47s, which were sold following the end of the war. Many of these were converted to passenger and/or cargo configuration. Ultimately, just five Super DC-3s were completed, with at

least three being delivered for commercial use. The prototype Super DC-3 (actually a rebuilt early C-47 designated YC-129) served with the US Navy alongside a number of existing R4Ds upgraded to Super DC-3 specification, under the R4D-8 designation (re-numbered as C-117D during 1962).

The C-117 was a revised C-47B derivative with a modified interior featuring more comfortable seating for 24 passengers, primarily as a staff transport. The main production version was the C-117A, of which only 16 were completed; the ending of World War Two resulted in manufacture being severely curtailed not just of this model, but the whole C-47 manufacturing programme. Among the many exploits of the DC-3/C-47 during the Cold War era was the Berlin Airlift of 1948-49, in which the type played a significant role flying supplies into the western part of Berlin, which was being blockaded by the Soviet Union and its allies. The C-47 transport aircraft involved were eventually largely replaced in this duty by the bigger Douglas C-54 Skymaster, itself a military version of the civil DC-4 airliner. However, the C-47 was to play a much more warlike role in the Vietnam War during the 1960s. In this conflict the type flew as a transport for the US forces involved, as well as for the CIA's clandestine airline Air America – but also fought as a gunship for the USAF and eventually the South Vietnamese armed forces. The AC-47 'Spooky' undoubtedly proved deadly in this frontline role.

Many exports

The DC-3 and C-47 family is one of the most widely exported aircraft types in history. It is almost easier to list the countries that have not used DC-3s or C-47s than to compile the long list of operators other than the US, which have used the type in peace or war, civil or military. Countries both large and small have flown it, either for civil use, or military employment... or in many cases both.

One of the most prolific users of the DC-3/C-47 series was the UK. In British service the type received the name Dakota, and that moniker is often used to describe (somewhat erroneously) the whole family of different types in some publications. Just fewer than 50 RAF squadrons have been identified as having flown 'Daks' at one time or another. The initial use for the RAF was militarised examples of the DC-2, some of which were impressed examples from US airlines. But the main employment involved the C-47 based Dakota, in several specific marks ranging from the Dakota Mk I to the Mk IV – the latter being based on the best of the breed, the C-47B. This included considerable use during World War Two, but also for many years after. The type's practicality was underlined by several continuing in support roles for various trials programmes, long after the type had been withdrawn from normal duties. In theory the type is still 'operational' in Britain, due to a single example flown by the Battle of Britain Memorial Flight at RAF Coningsby, Lincolnshire.

Overseas production

Two countries, the Soviet Union and Japan, manufactured the DC-3/C-47 layout in addition to flying examples supplied from Douglas. A DC-3/C-47 look-alike was the Soviet Union's PS-84/ Lisunov Li-2.

The Soviet Union made an initial order for a batch of DC-3 transports for the state airline Aeroflot, with 21 examples apparently being delivered up to 1939; two of these airframes are believed to have acted as pattern aircraft for the eventual Soviet licence-production of the DC-3,

Above
(Top)Aircrew and members of the US 101st Airborne Division on the eve of D-Day. A few of their C-47 mounts can be seen in the background. The nearest 'CU'-coded C-47A belonged to the 72nd Troop Carrier Squadron of the 434th Troop Carrier Group, Ninth Air Force, at RAF Aldermaston

(Bottom) Christmas 1948 was spent in less-than-ideal circumstances for the seven occupants of this crashed C-47 and four would-be rescuers. The Skytrain force landed in Greenland and eventually rescue had to be made on December 29, 1948 by a ski-equipped C-47 KEY Collection

Right *The C-47 remained a significant USAF cargo aircraft in the post-war years. This image shows several Military Air Transport Service C-47s parked at Berlin's Tempelhof Airfield during the Berlin Airlift of 1948-49*

although some unassembled kits were allegedly supplied to the Soviet Union by Douglas to kickstart Soviet production lines. The PS-84/Li-2 was markedly different to the C-47, although its cowlings housing the indigenous Shvetsov M-62 (later designated Ash-62) radial engine resembled the early DC-3 examples with their Wright Cyclone engines, in nacelles different compared to, for example, the Pratt & Whitney R-1830 Twin Wasp-powered C-47. Some Soviet machines were armed with a dorsal mid-upper turret, and flexible machine guns could be fired out of cabin windows. The type was also configured as a bomber, whereas USAAF C-47s were never converted for this role and usually flew unarmed. Following World War Two, a number of surviving DC-3 airframes purchased pre-war direct from Douglas for operation by Aeroflot were re-engined with Soviet-produced radial engines, due to there being spares shortages for the Wright Cyclone engines originally supplied with these aircraft. In Japan, the Showa L2D and Nakajima L2D were licence-built derivatives of the DC-3 primarily for military use as the Navy Type 0 Transport. They received the Allied reporting name 'Tabby' during World War Two. After Japan successfully acquired licence DC-2 production rights in 1935, the Japanese company Nakajima gained permission during early 1938 to licence-build the DC-3. It is believed the agreement was for some $90,000. In similar fashion to production in the Soviet Union, the L2D was modified by the Japanese to suit local standards, measurements, and manufacturing techniques. Power was provided by two Mitsubishi MK8 Kinsei 43 14-cylinder air-cooled radial engines, of some 1,000hp each for take-off. The Nakajima prototype first flew in October 1939 and production commenced the following year. The L2D was subsequently involved in much action during World War Two, ironically supporting Japanese forces fighting against the US. According to US intelligence summaries compiled at the end of the war, 487 'Tabby' airframes were built.

"The growth potential of the original layout was demonstrated when the type was deemed suitable for conversion from radial engine power to turboprop"

Below *Inhospitable terrain was one of many hazards the type had to cope with. This Indian-operated Dakota was photographed at some point in the fighting over Kashmir between India and Pakistan during 1948* KEY Collection

Increased power

The versatility and growth potential of the original DC-3/C-47 layout was demonstrated when the type was deemed suitable for conversion from radial engine power to turboprop. This considerable uprating of the available power, coupled with enhanced performance, guaranteed the survival of the type as a viable transport – and has led to some turboprop examples continuing in frontline service up to the present day. Among the initial conversions was work performed for British European Airways (BEA) in the late 1940s, when a Dakota was converted to accept Rolls-Royce Dart turboprops. An intention for this 'Dart-Dakota' was to gain turboprop experience prior to the introduction of the similarly powered Vickers Viscount four-engined airliner. Since then there has been a wide variety of conversions, some of which have proven more successful than others. Among the most unusual conversions were the twin-engined turboprop DC-3 make-overs by Conroy Aircraft of Goleta, California. This company's initial type was the Conroy Turbo-Three, of which two airframes were converted. The first example was powered by Rolls-Royce Darts from a damaged Viscount airliner. Characterised by very distinctive engine installations – which were markedly different to the original R-1830 Twin Wasp radial engines – the conversion did not find a market although the type's performance was

enhanced compared to the basic DC-3 layout. The second conversion (N156WC) was called the Super Turbo-Three because it was based on a Super DC-3 airframe.

Following the Turbo-Three/Super Turbo-Three was the even more radical, three-engined Conroy Tri-Turbo-Three, which was powered by three Pratt & Whitney Canada PT6A-45 turboprop engines, of some 1,175shp each. One of these powerplants was mounted in the nose of the aircraft. It first flew in this converted configuration during November 1977, and was the original Dart-powered Turbo-Three rebuilt to this new engine configuration. Thus equipped, and far more powerful that the original DC-3 that it only partly resembled, the aircraft was used in several Polar expeditions, flying in both the Arctic and Antarctic, for which a ski undercarriage was fitted. A second conversion was started after the initial aircraft was damaged by an on-board fire.

In South Africa, the need for an uprated version of the DC-3/C-47 line became apparent during the period of internal and external problems in that part of southern Africa. An answer was the BSAS converted DC-3/C-47 Turbo Dakota, an indigenous modification programme using of a variety of airframes for the South African Air Force by Braddick Specialised Air Services International. Powered by two Pratt & Whitney Canada PT6A-65R turboprop engines, the conversion featured revised systems, a stretched fuselage configuration, and modern avionics. Some 50 examples are believed to have been converted to various standards under this programme. Without doubt, among the most successful and long-lived turboprop conversions of the DC-3/C-47 line is the Basler BT-67. Produced by Basler Turbo Conversions of Oshkosh, Wisconsin, it is a remanufactured and extensively modified DC-3 derivative. The Basler conversion work has included the installation of new Pratt & Whitney Canada PT6A-67R turboprop engines, lengthening the fuselage, strengthening the airframe, fitting modern avionics, and various modifications to the wings. The initial conversion work dates from the late 1980s and early 1990s, and so far over 60 examples have been completed, the exact number being difficult to determine due to the use of some airframes in sensitive local conflicts. This is because, in addition to civil use, mainly for survey work in areas such as Antarctica, there is a military version of the BT-67. Drawing on experience with the AC-47 'Spooky' in the Vietnam War, Basler offers a gunship conversion which has been purchased by several countries and is still currently in use.

Overall production

Estimates of the combined number manufactured of all DC-3, DST, C-41, C-47, C-53, Li-2, 'Tabby' and the many related versions vary almost as much as the widely published possible production totals. Figures of over 16,000 for all types are often nowadays quoted, but any definite total has to be greeted with a pinch of salt. Writing in the 1980s, DC-3 historian Mike Gradidge quoted a figure of 10,665 DC-3,C-47/C-53/C-117 and US Navy R4D, to which can be added the 487 'Tabby' (L2D) from Japan and the approximately 4,500 plus PS-84/Lisunov Li-2 in the Soviet Union. Douglas' plant at Santa Monica built the C-41 and C-53 Skytrooper, while Long Beach and Oklahoma City were responsible for the C-47 line, with the latter also manufacturing the post-war C-117. Santa Monica made all the initial civil DC-3 models, while Oklahoma City built the post-war DC-3D.

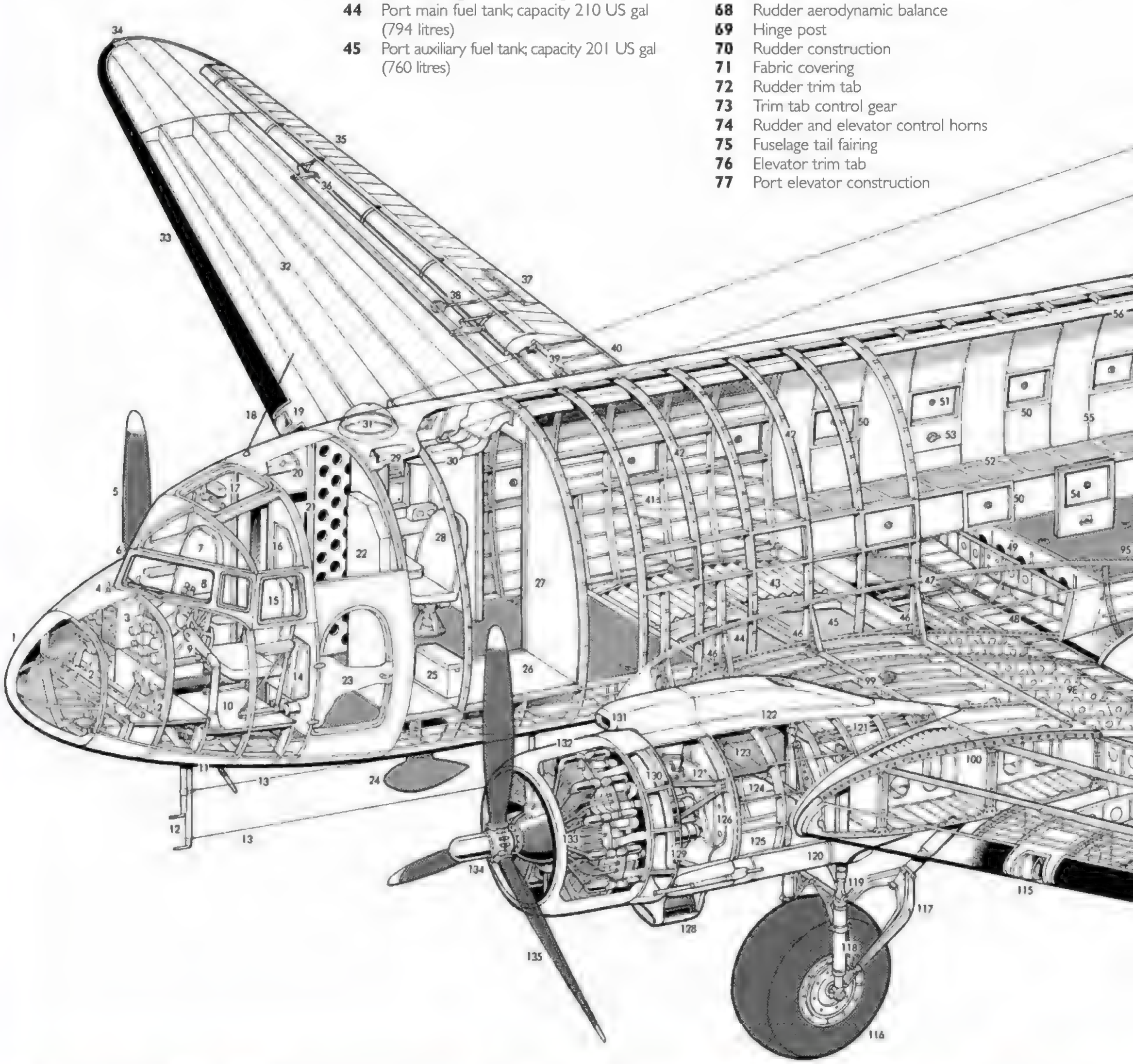
Below
With a South Vietnamese C-47 taking off in the background, a USMC Skytrain (probably a C-117D) gets ready to taxi. This image was captured at Da Nang in South Vietnam during December 1966
KEY Collection

FlyPast

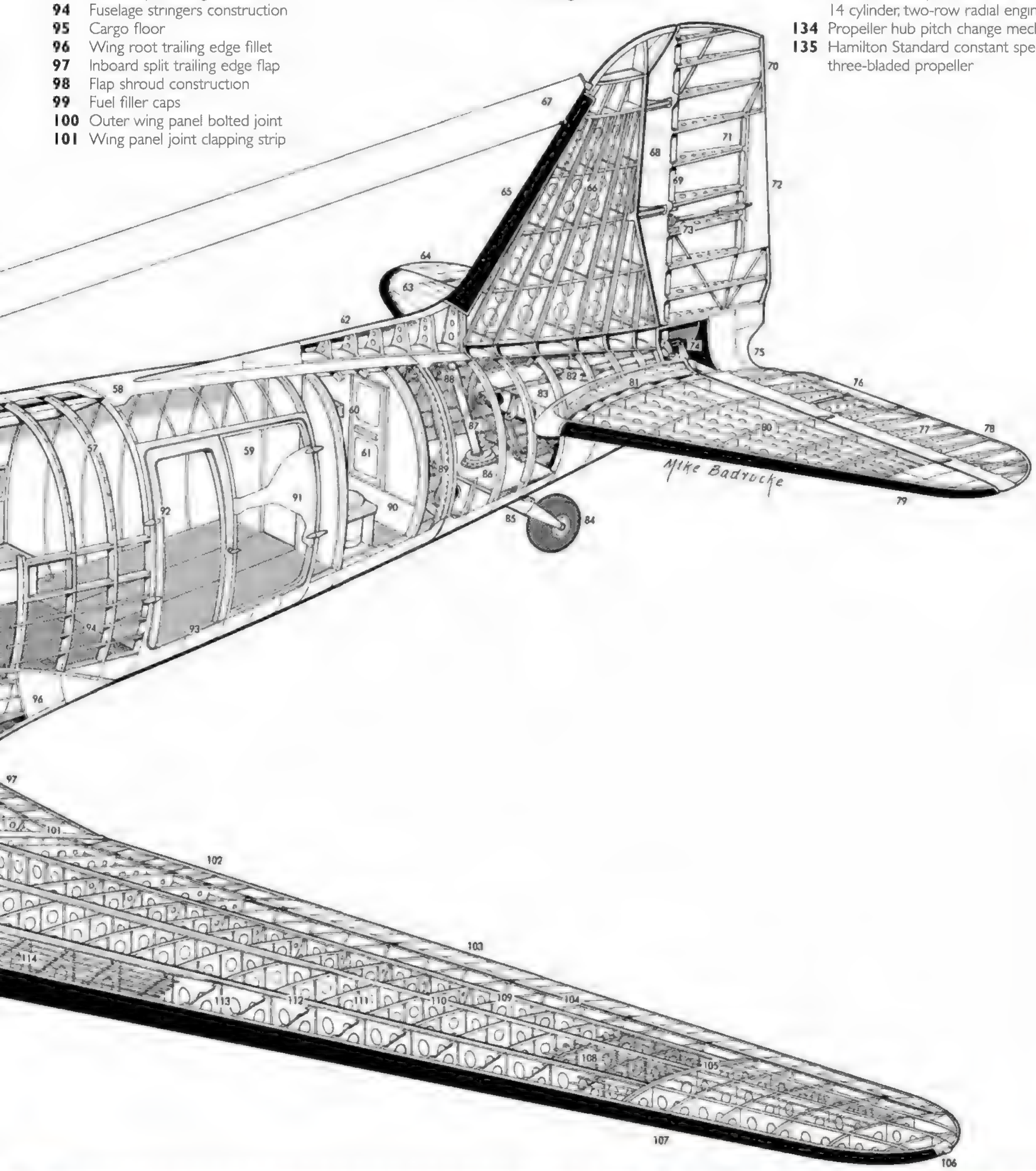
A cascade of fireworks bursts over Flabob Aviation's beautiful 1943-built C-47B N103NA 'Flabob Express' during a night-time show at 2014's EAA AirVenture at Oshkosh, Wisconsin – the type's iconic, and indomitable lines more than evident...

KEY: Jamie Ewan

1 Hinged nose cone: access to instruments and controls
2 Rudder pedals
3 Instrument panel
4 Windscreen de-icing fluid spray nozzle
5 Starboard propellor
6 Windscreen panels
7 Co-pilot's seat
8 Engine throttles
9 Control column
10 Cockpit floor level
11 Access panels to control cable runs
12 Pitot static tubes
13 Aerial cables
14 Propeller de-icing fluid tank
15 Pilot's seat
16 Cockpit bulkhead
17 Cockpit roof escape hatch
18 Whip aerial
19 Starboard landing/taxiing lamp
20 Windscreen de-icing fluid tank
21 Starboard baggage compartment
22 Electrical fuse panel
23 Crew access door
24 ADF loop aerial fairing
25 Life raft stowage
26 Port baggage compartment
27 Main cabin bulkhead
28 Radio operator's seat
29 Air scoop
30 Heating and ventilating system heat exchangers
31 Astrodome observation hatch
32 Starboard outer wing panel
33 Pneumatic leading-edge de-icing boot
34 Starboard navigation light; green
35 Starboard aileron
36 Aileron cable controls
37 Trim tab
38 Trim tab control gear
39 Flap control shaft
40 Starboard outer flap
41 Fuselage frame and stringer construction
42 Centre fuselage main frames
43 Centre wing section corrugated inner skin
44 Port main fuel tank; capacity 210 US gal (794 litres)
45 Port auxiliary fuel tank; capacity 201 US gal (760 litres)
46 Wing spar attachments
47 Flap hydraulic jack
48 Centre section flap
49 Floor beam construction
50 Cabin window panels
51 Window panel grommets for small arms attachments
52 Paratroop seating; 28
53 Starboard emergency exit window
54 Port emergency window
55 Cabin lining panels
56 Overhead ventilation and heating duct
57 Rear cabin frames
58 Fuselage covering
59 Rear cabin bulkhead
60 First aid kit
61 Access panel to control runs
62 Fin root fillet
63 Starboard tailplane
64 Starboard elevator
65 Fin leading edge pneumatic de-icing boot
66 Fin construction
67 Aerial cables
68 Rudder aerodynamic balance
69 Hinge post
70 Rudder construction
71 Fabric covering
72 Rudder trim tab
73 Trim tab control gear
74 Rudder and elevator control horns
75 Fuselage tail fairing
76 Elevator trim tab
77 Port elevator construction



78 Fabric covered elevator
79 Leading-edge pneumatic de-icing boot
80 Tail plane construction
81 Tail plane attachment joint
82 Rudder stop cables
83 Tailplane centre section
84 Tail wheel
85 Shock absorber leg strut
86 Tailwheel mounting plate
87 Tail wheel strut
88 Rudder and elevator control cables
89 Tail/fuselage joint frame
90 Toilet
91 Rear cargo door
92 Forward cargo door
93 Paratroop/Passenger door
94 Fuselage stringers construction
95 Cargo floor
96 Wing root trailing edge fillet
97 Inboard split trailing edge flap
98 Flap shroud construction
99 Fuel filler caps
100 Outer wing panel bolted joint
101 Wing panel joint clapping strip
102 Outer split trailing edge flap
103 Port aileron
104 Aileron fabric covering
105 Detachable wing tip joint ribs
106 Port navigation light; red
107 Leading-edge pneumatic de-icing boot
108 Wing stringer construction
109 Rear spar
110 Centre spar
111 Wing rib construction
112 Front spar
113 Leading-edge nose ribs
114 Leading-edge stringers
115 Port landing/taxiing lamp
116 Port main wheel
117 Main undercarriage rear strut
118 Shock absorber leg strut
119 Undercarriage frame joints
120 Exhaust pipe
121 Undercarriage bungee cables
122 Engine nacelle fairing
123 Oil tank; capacity 28.7 US gal (109 litres)
124 Undercarriage retraction jack
125 Mainwheel well
126 Engine firewall
127 Engine bearer struts
128 Oil cooler
129 Cooling air exit flaps
130 Exhaust collector pipe
131 Engine air intake
132 Engine cowlings
133 Pratt & Whitney R-1830-90C air cooled, 14 cylinder, two-row radial engine
134 Propeller hub pitch change mechanism
135 Hamilton Standard constant speed three-bladed propeller



JOHNNY SKYTROOPER, U.S.A.

LOOK OUT BELOW! Johnny Skytrooper is rough, tough and nasty. Striking behind enemy lines he hits hardest where it hurts the most. Douglas C-53 "Skytrooper" transports carry him swiftly on his mission of destruction; Douglas C-47 "Skytrains" and C-54 "Skymasters" follow through with his supplies. Setting the pace for war transport production, Douglas is proud to provide the equipment for Johnny Skytrooper to "win with wings." Douglas Aircraft Co. Inc., Santa Monica, Calif.

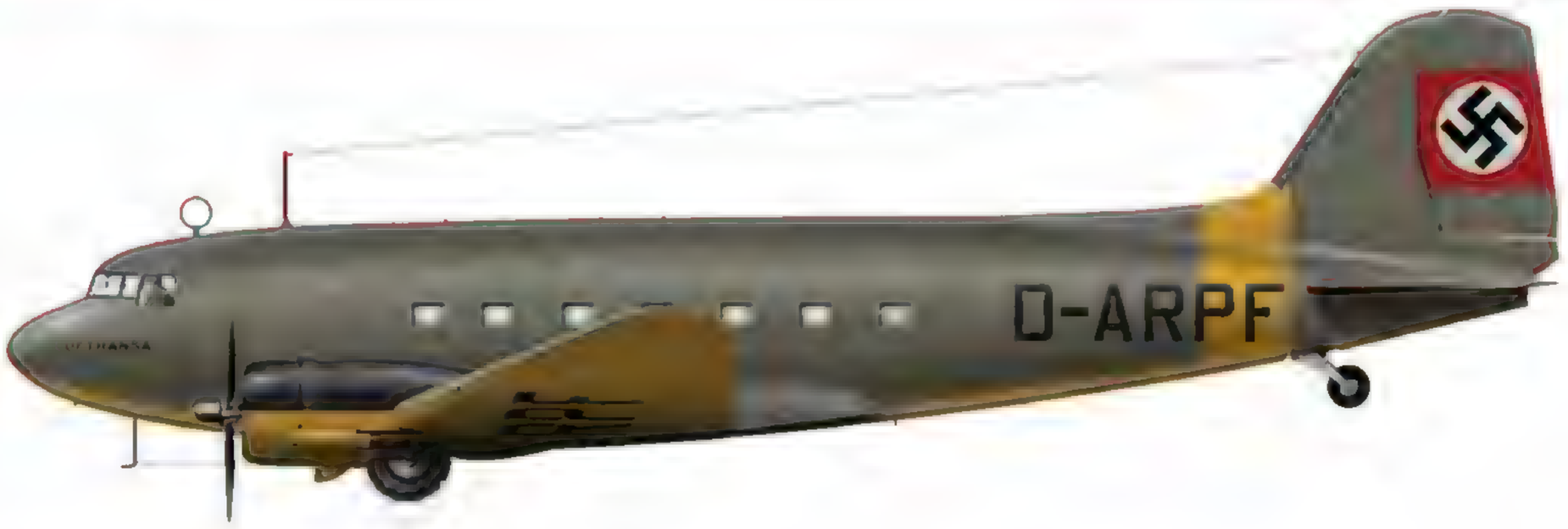
Left to right (1) C-54 "Skymaster" (2) C-47 "Skytrain" C-53 "Skytrooper" (3) A-20 "Boston," A-20 "Havoc" (4) SBD "Dauntless," TBD "Devastator," A-24 "Banshee"

DOUGLAS

MEMBER, AIRCRAFT WAR PRODUCTION COUNCIL, INC.

Douglas C-47A 6877 'Dazzle Dak', South African Air Force, 25 Squadron, AFB Ysterplaat, 1969 – *Rolled out by Douglas from its Oklahoma City factory in the US during 1945 as a C-47A-1-DK, this machine was initially taken on strength by the United States Army Air Force as 42-92156 on September 25. Transferred to the RAF that October as FL564, it joined the South African Air Force on October 4, 1945. Allocated to 25 Squadron, the aircraft gained this infamous scheme when modified as a target tug. Nicknamed the 'Dazzle Dak', it remained as such well into the 1980s, before eventually being repainted in standard camouflage. One of 12 examples later converted to a C-47TP Turbo Dak during the late 1980s and early 1990s for long-range maritime surveillance and transport duties with 35 Squadron at Ysterplat, it was written-off following a landing accident in November 2012*

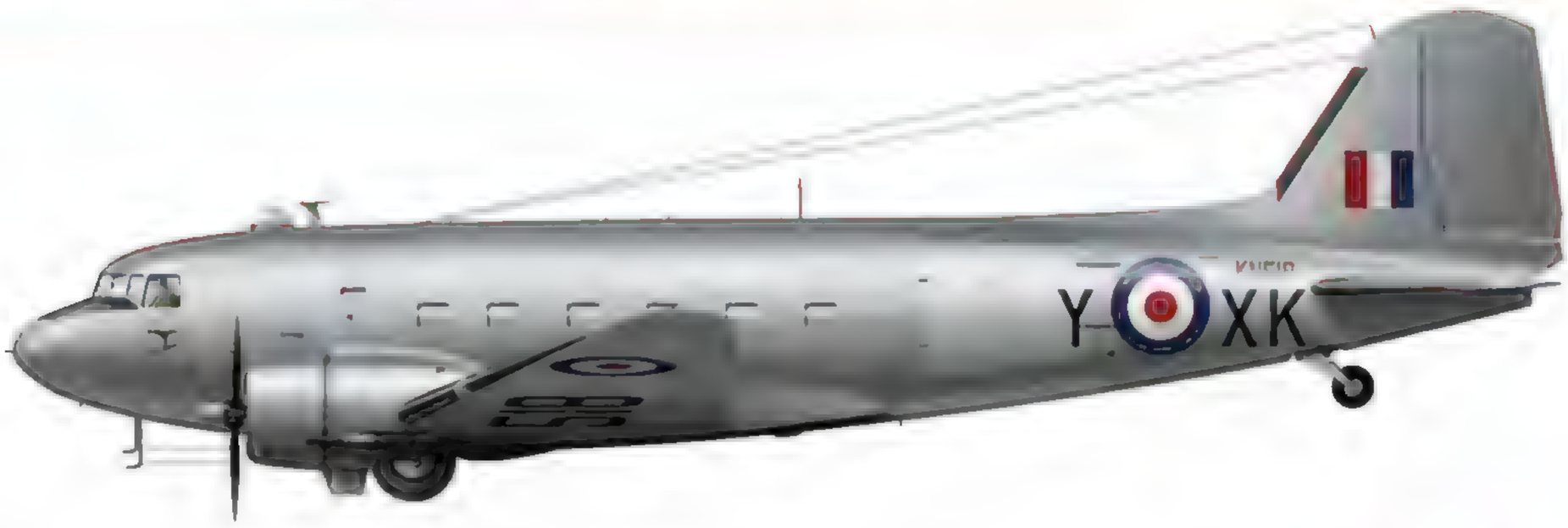
All profiles Andy Hay-Flyingart



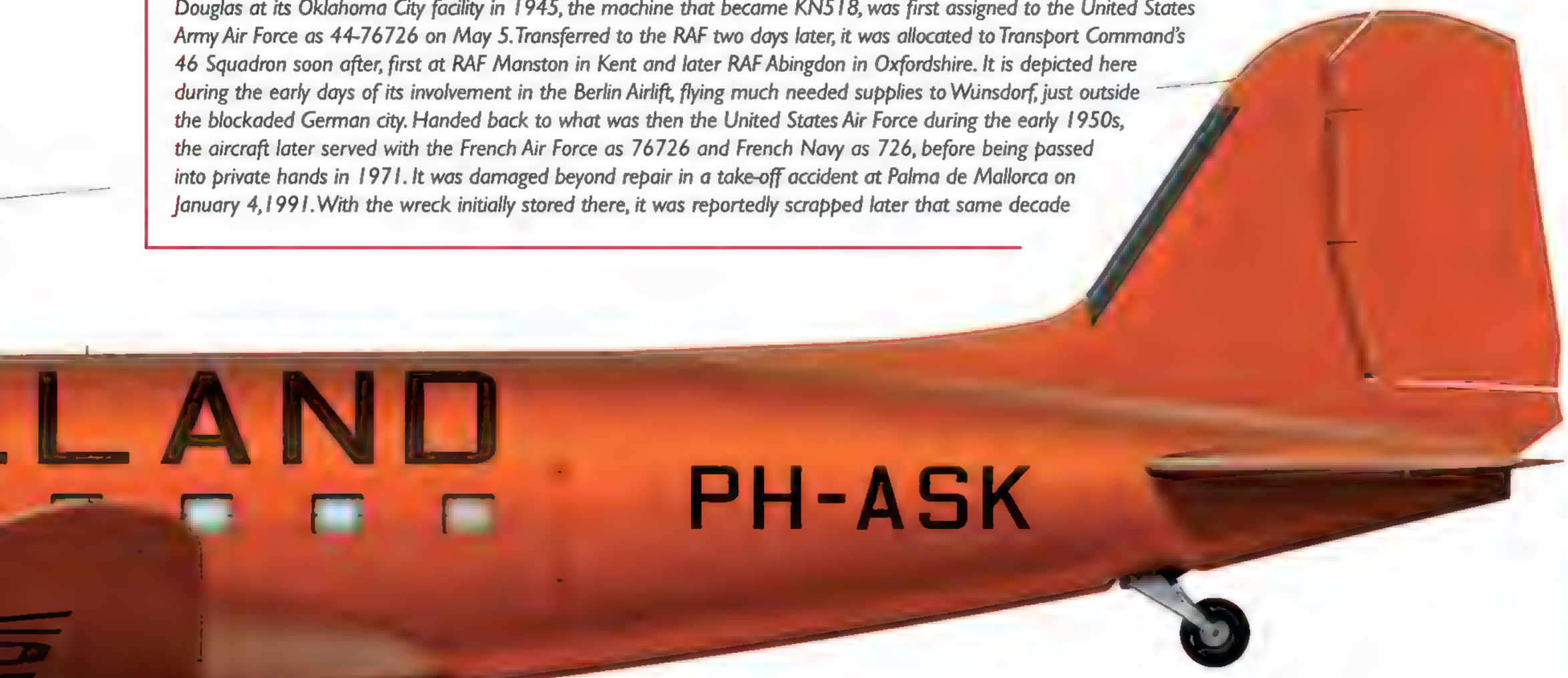
Douglas DC-3 Dakota D-ARPF, Deutsche Lufthansa, 1941 *– Rolled out as a DC-3-194B from Douglas's Santa Monica factory in Spring 1937, this machine was one of just 607 civilian examples of the type, being the 66th airframe built. Delivered to KLM Royal Dutch Airlines via intermediary Fokker as PH-ALV on April 12, 1937, and christened 'Valk', it was powered by a pair of 1,000hp Wright R-1820 Cyclone engines and boasted both a 12-volt electrical system and a starboard entry door. Captured at Amsterdam's Schiphol Airport in May 1940, it was pressed briefly into Luftwaffe service as NA+LC, before being handed over to the Germany's national carrier Deutsche Lufthansa and registered D-ARPF in June that year. Recaptured by British forces in Spain in 1945, it was handed back to KLM. Becoming PH-TBV, it was sold to UK carrier Skyways the following year and later scrapped as G-AICV*

Douglas DC-3A PH-ASK KEMPHAAN, KLM Royal Dutch Airlines, 1939 *– One of 76 DC-3s ultimately operated by the flag carrier of the Netherlands, PH-ASK was assembled by Fokker and delivered unpainted on March 18, 1938. Pressed into service, the aircraft was later resprayed in 'Neutrality Orange', following the shootdown of DC-3 PH-ASM Mees on September 24, 1939 – the aircraft was attacked by a Luftwaffe Heinkel He 115 floatplane over the North Sea while flying between Holland and Sweden, killing one of 12 on board. Captured by the Germans at Norway's Fornebu Airport on May 16, 1940, the aircraft was adopted by the Luftwaffe as NA+LB and later by the German national carrier Deutsche Lufthansa as D-AOFS. PH-ASK's Certificate of Registration expired on March 18, 1941. Transferred back to the Allies in Sweden on April 23, 1945, it was scrapped later that year*

Douglas DC-3 Dakota G-AGBB, British Overseas Airways Corporation, June 1, 1943 *– On June 1, 1943, G-AGBB – a 1936 Santa Monica-built DC-3-194, formerly PH-ALI 'Ibis' with KLM – was operating a scheduled British Overseas Airways Corporation service between Portugal's Lisboa-Portela de Sacavém Airport and Bristol's Whitchurch Airport as BOAC Flight 777A when it was attacked by eight Luftwaffe Junkers Ju 88s. Crashing into the Bay of Biscay, all 17 on board were killed, including British actor and anti-Nazi propagandist Leslie Howard, Tyrrell Mildmay Shervington, the director of Shell-Mex & BP in Lisbon, an agent with the Special Operations Executive and Wilfrid Israel, known for his efforts to save Jewish people from the Holocaust. Theories on why G-AGBB was attacked include that it was thought Winston Churchill was on board. With British and German civilian aircraft operating from the same facilities at Portela, traffic was watched by both Allied and Axis spies. It was known the Lisbon-Whitchurch route frequently carried agents back and forth, as well as escaped prisoners of war to Britain*



Douglas Dakota IV KN518/XK-Y, Royal Air Force, 46 Squadron, July 1948 – *Constructed as a C-47B-30-DK by Douglas at its Oklahoma City facility in 1945, the machine that became KN518, was first assigned to the United States Army Air Force as 44-76726 on May 5. Transferred to the RAF two days later, it was allocated to Transport Command's 46 Squadron soon after, first at RAF Manston in Kent and later RAF Abingdon in Oxfordshire. It is depicted here during the early days of its involvement in the Berlin Airlift, flying much needed supplies to Wünsdorf, just outside the blockaded German city. Handed back to what was then the United States Air Force during the early 1950s, the aircraft later served with the French Air Force as 76726 and French Navy as 726, before being passed into private hands in 1971. It was damaged beyond repair in a take-off accident at Palma de Mallorca on January 4, 1991. With the wreck initially stored there, it was reportedly scrapped later that same decade*



Douglas C-47B Skytrain 4348491/EY, Republic of Vietnam Air Force, 415th Transport Squadron, Tan Son Nhut Airfield, 1970 – *Starting life as C-47B-1-DK 43-48491 in 1943, this Oklahoma City-built machine spent the rest of that decade in the US, before being shipped across the Pacific to serve in both Japan and Korea during the 1950s. In 1964, it was transferred to Vietnam, where it was converted into a FC-47D gunship with a bank of ten .30-cal machine guns, each with 5,000 rounds, two years later. Serving with the 1st Air Commando Squadron as 0-4849, it was nicknamed 'Get-Em Bullitt'. Returned to standard Skytrain configuration, it was later passed to South Vietnam Air Force's 415th Transport Squadron at Tan Son Nhut via the Military Assistance Program. Said to have been returned to the United States Air Force in early 1973, its trace ends with the transfer to Cambodia soon after...*

FAREWELL

When a DC-3 turboprop ('TP') conversion programme was officially sanctioned in 1987, the sensitivity of the project – named Felstone – meant that several location options were evaluated.

The evocatively named Wonderboom Airport, situated ten miles north-east of Swartkop AFB and home to programme-partner WonderAir, was eventually selected. Not only was it hoped that the relatively remote location could keep the project from prying eyes, but WonderAir was already operating the Schafer/AMI DC-3TP N240GB in civilian guise.

Ninety-six Pratt & Whitney PT6A-65AR engines were purchased along with 48 conversion kits, the first parts of the latter arriving in February 1988. It is understood only two of the conversion kits were obtained from international sources while the remainder were manufactured locally. The two imported kits provided a training platform for ten South African Air Force (SAAF) and Denel (a state owned South African aerospace and military technology company) personnel initially seconded to the project at Wonderboom, as conversion of two civilian Dakotas (C-47Bs ZS-DHX / 32656 and ZS-LJI / 34225) got underway.

Successful completion of these two saw the SAAF's Project Felstone gain momentum in

TO THE 'TPS'

Following eight decades of service, maintenance challenges have finally brought down the curtain for the South African Air Force's venerable Dakota fleet. **Steve McLean** reflects on their tenure in SAAF hands

August 1989 with C-47As 6879 (9766) and 6839 (13540) repositioning from 44 Squadron at Swartkop to Wonderboom. They were placed on the civilian register as ZS-MRR and 'MRS respectively on February 14, 1990, in a further effort to conceal the military connection. Physical conversion began on September 14, 1989, with technicians stripping 6879.

Primary changes covered replacing the radial engines with the PT6A-65ARs, lengthening of the fuselage by 40 inches forward of the wing root, fitting new avionics and flight control systems, improved cockpit layout, replacing some electrical circuitry, new fuel management and hydraulic systems, improved fire-fighting systems, as well as updating 'comfort' facilities and modernising the fuselage interior for cargo haulage. ZS-MRR completed its maiden post-conversion flight in November 1990, followed by 'MRS in January 1991.

These two airframes returned to SAAF service but would retain civilian registration until 1995 when reverting to the previous serial numbers. The SAAF's policy of re-using Dakota serial numbers from airframes long-since off-strength through attrition or sale continued and are thus denoted [2] in this text.

Production lines

Two production lines were established under the next phase of the project – one under 1

Above
35 Squadron line-up at the detachment facility known as 'The Farm' on the eastern side of Cape Town International Airport on September 19, 2006. From front to rear 6852, 6814, 6845[2] and 6885 with three of the four in the latter maritime scheme with the white upper fuselage All author-unless noted

"With the exception of the EW airframe, it was the five maritime aircraft whose change in appearance was the most noticeable"

Above *Dakotas 6839, 6825 and 6877 of 35 Squadron at the Cape Town International Airport detachment facility on September 16, 2008, with the first and third sporting the low-viz 35 Squadron badge*

Below *Dakota 6825 was modified during the Block 2 programme, and is pictured flying on February 2, 2021*

Air Servicing Unit, AFS Snake Valley (alongside Swartkop), in late 1990 and the second at 2 Air Servicing Unit, Ysterplaat AFB, in Cape Town in 1991. These had a blend of SAAF and Denel personnel for conversion of what became known as the 'Block 0' airframes under Project Accord.

The first two airframes converted on these facilities were 6835[2] (20175) which featured in the official 'handover' at Swartkop on August 26, 1991, and 6858[2] (32897) which completed its first flight on October 15, 1991, and was rolled-out to assembled media at Ysterplaat two days later. Although original planning called for some 39 airframes to be converted, this would later be reduced to 33, comprising 20 'line' Dakotas, five IP/VIP and eight maritime aircraft. Ultimately, 29 were completed.

Problems began to mount as the aircraft were released to service, with deficiencies from minor to major being identified. Among the more critical issues were the ingestion of water into the cockpit and its effect on avionics while flying in rain, cracking of engine cradles, the discovery of subtle differences in the electrical systems during servicing, and a paucity of operator and servicing manuals. Sub-working groups were established to address the problems which resulted in the unplanned-for growth of personnel numbers involved on the conversion lines along with delays through the need to submit proposals to a control committee in whom approval, quality, production and logistics for the improvements was now vested.

WonderAir had in the interim sought, and obtained, Director of Civil Aviation (DCA) approval for a modification to allow reinforcing of the fuselage centre section and wings, and a consequent increase in the max take-off weight from 26,900lb (12,200kg) to 29,000lb. The SAAF duly acquired Centre Section Reinforcement kits and began modification of the fleet at Snake Valley resulting in the type designator being extended from DC-3/C-47-65TP to DC-3/C-47-65ARTP, and the re-worked aircraft as 'Block 1' airframes. Not all the 'Block 0' TPs were converted;

those that missed the cut would later become the SAAF's first disposals.

Project Caret

Following retirement of the Avro Shackleton fleet in 1984, the SAAF had little option but to utilise 1830-radial Dakotas for maritime patrol and search and rescue priorities. With the conversion programme gathering momentum, five transport TPs at 35 Squadron were configured to allow for a removable console to be fitted as and when required.

The lessons learned were fed into a project named Caret that had been initiated in 1989 for the complete rebuild of Dakota airframes to a dedicated maritime patrol aircraft standard. These featured anti-submarine and extended range capabilities, plus FLIR and a 360° search radar. Two aircraft were assigned to the project and transferred to Snake Valley, serial numbers 6834 (12590) and 6882 (15896/32644).

Flight trials following a partial rebuild on the latter began in September 1995 and the following February the aircraft transferred to Test Flight Development Centre (TFDC) at Overberg AFB near the town of Bredasdorp in the southern Cape. Concerns over flight handling characteristics and breaching of the maximum all-up weight parameters, along with the expectation that a dedicated maritime patrol aircraft could and would be sourced following the change in political circumstances, led to a scaling back and eventual cancellation of the project. However, this did not happen before the partially converted 6834, with fixed maritime consoles but no radar and radome, had begun its own initial flight trials at Swartkop.

TP 6834 subsequently transferred back to 35 Squadron where it undertook occasional flights before being sold on the civilian market in May 2001, registered ZS-OSO. The original trial platform, 6882, became a testbed for a series of radar and communication trials over the next few years before also being sold into civilian hands on August 1, 2003, where it became ZS-MAP. Both were eventually acquired by the National Test Pilot School at Mojave in California. The SAAF ultimately settled for a maritime surveillance platform with reduced functionality that began with the conversion of serial number 6885 (12596).

Under a moody Cape Town sky, Dakota 6854 of 35 Squadron awaits its next sortie on September 16, 2008

Electronic warfare

During the so-called Border War, 44 Squadron's C-47A 6828 (12415) had served as an airborne listening station with a COMINT suite installed for the interception of communications while flying parallel to the Angolan border from Rundu, Namibia. Two DC-4s were introduced to the role between 1977 and 1982, with 6828 being relegated to a stand-in platform when the Skymasters were required to undergo servicing schedules.

Following the cessation of hostilities, 6828 returned to Swartkop and undertook regular transport flights before transferring to 86 Multi-

Above
Dakota 6832 in the company of 6858 and 6811 at the 35 Squadron Cape Town (at that stage still DF Malan International Airport) facility on May 18, 1994. The former did not enter the conversion programme and was transferred to the SAAF Museum facility at Ysterplaat

Left
Dakota 6875 was initially earmarked for the Block 2 upgrade programme before being withdrawn and returned to duties, only to be grounded shortly after. It's seen here on September 23, 2006, at Ysterplaat where it remains in storage to this day

Above
Dakota 6877 flying at the September 2008 version of the African Aerospace and Defence Expo at AFB Ysterplaat

Engine Flying School (MEFS) at Bloemspruit AFB in October 1991. It was subsequently placed on the TP conversion line at Snake Valley. Electronic warfare (EW) fitting was completed at Snake Valley by a team drawn from both the SAAF and civilian industries. The first flight of the modified airframe was completed on July 17, 1997, before the TP relocated to the TFDC for further flight trials three weeks later. EW evaluations began in May the following year.

Not dissimilar to the problem faced during the maritime platform trials, 6828 pushed the boundaries of weight tolerances once the desired equipment was fitted, leading to changes in handling characteristics. It also had an impact on where and when the aircraft could be deployed due to 'hot and high' challenges in the north of the country. The Dakota was immediately identifiable through an array of blade-shaped antennae on the fuselage, an electronic support measure OMNI antenna atop the fuselage just aft of the cockpit, with a spinning DF antenna positioned slightly further back.

With the retirement of 60 Squadron's Boeing 707s, the SAAF's primary EW capabilities now rested on 6828 based with 35 Squadron, at Ysterplaat.

Between 1999 and 2005 the SAAF's remaining TPs were upgraded from 'Block 1' to 'Block 2' standard at Snake Valley by combined SAAF, Denel AMG and Aircraft Maintenance Personnel teams. Among the changes this entailed were further waterproofing in the cockpit area, changes to aircrew seating, replacement of the windscreen to a sturdier version in an effort to reduce impact from hailstones and bird strikes, as well as introducing system changes to improve technician interfaces and thus reduce airframe 'downtime'.

The IP/VIP configuration was removed from service and the combined fleet reduced to 11 aircraft – five dedicated maritime platforms (serial numbers 6814 [11990], 6825 [12160], 6852 [15557/27002], 6854 [15887/32635] and 6885 [12596]), four transport versions (6839 [13540], 6840 [25311], 6877 [11925] and 6887[2] [12704]), an EW platform (6828) and a photo-reconnaissance TP that could also be used for transport if required (6837 [13539]). The two-tone light blue colour scheme gave way to an overall Dark Sea Grey finish on the transport and EW aircraft while the maritime examples now featured Dark Sea Grey with a White upper fuselage.

Variety of tasks

With the obvious exception of the EW airframe, it was the five maritime aircraft whose change in appearance was the most noticeable. Port cabin windows were closed-off and large observation windows inserted on both the port and starboard sides, slightly behind

Right
Dakota 6884 flies along the Cape's west coast. The short flight from Ysterplaat to Langebaanweg some 60 miles to the north has been a favourite for aircrew on all types over the years as the sparsely populated area allows for a low-level 'hop' along the shoreline SAAF Museum Ysterplaat

the trailing edge root. Internally the aircraft featured consoles along the port side with stations for a radar operator, navigator and radio operator, as well as weight-reduction features such as replacing the aluminium floor with a composite material to extend endurance.

Based at Ysterplaat, 35 Squadron became the operator of TPs in their most varied form with a mix of maritime, transport/drogue towing, IP/VIP variants, and the sole EW conversion. The first, serial 6858[2], was received on November 22, 1991. The radial engine and TP versions were operated in tandem with the former being withdrawn and placed into the conversion programme as required. 6864 (12580) and 6884 (12064) were taken on strength in 1992. On September 9, 1994, the last 1830-radial engine sortie was flown. 35 Squadron became a pure TP unit and by the end of the year had six on strength (6840 [25311], 6858[2], 6864, 6884, 6875[2] [12065] and 6854) with a blend of transport, IP and maritime configurations.

By the end of 1995 a further four had been added in 6845[2] (14642/26087), 6870[2] (15298/26743), 6877 and 6880[2] (14101/25546). Drogue towing was also undertaken through the attachment of an electric winch to 6858[2] and, later, 6840. Five airframes were rotated through maritime surveillance duties (6840, 6845[2], 6854, 6864 and 6877) by the addition of a removable console featuring stations for a radio operator, navigator and radar operator. The airframes co-utilised by 80 Air Navigation School (also based at Ysterplaat) became identifiable with the addition of celestial names below the cockpit (6870[2] Vega, 6880[2] Sirius and 6884 Spica). With the EW platform 6828 on strength, the squadron became an integral part of anti-piracy operations in the Mozambique channel in conjunction with the South African Navy when deployed to Pemba on Operation Copper between February 2011 and March 2015.

With a pedigree dating back to Egypt in World War Two and a proud transport record in the interim, 44 Squadron was a natural choice for receipt of the first TP-converted airframe from the SAAF's own line, 6835[2], on March 19, 1992. Seven months later the first of four IP/VIP Dakotas were received when 6857 (16627/33375) transferred from the programme at Snake Valley to Waterkloof AFB, being joined by 6852, 6875[2] (11746) and 6892 (14994/26439) later. Other airframes eventually utilised for cargo and troop transport by the squadron were 6814, 6820 (12115), 6825, 6837, 6868 (16200/32948), 6885,

"Based at Ysterplaat, 35 Squadron became the operator of TPs in their most varied form with a mix of types"

Above
Inside the 'office' – Dakota 6887 at Ysterplaat on May 18, 2024 Brian Stockland

Below
Electronic Warfare platform 6828 in its original scheme at the 35 Squadron detachment facility, Cape Town, on September 19, 2006

Right
Believed to be one of the last occasions two SAAF Dakotas were airborne together – 6825 and 6852 approach Ysterplaat on August 21, 2020

SAAF C-47TP CONFIRMED LOSSES

6816 Crashed alongside the runway during short-field take-off training at Bloemspruit on May 6, 1994, with 86 Multi-Engine Flying School.

6840 Struck mountainside at Giants Castle, Drakensberg range in Kwazulu-Natal, in bad weather during flight from Pretoria to Mthatha in the Eastern Cape on December 5, 2012, with 35 Squadron.

6877 Departed the runway during a landing at Mthatha Airport, Eastern Cape, and rolled into a drainage ditch, subsequently deemed damaged beyond repair, on November 7, 2012, with 35 Squadron.

Below
Partially completed conversions in primer at the Snake Valley facility, Swartkop
Dave Becker

Bottom
The first in-house conversion, 6835, was handed over to Chief of the SAAF, Lt Gen James Kriel, by Col Jacobus du Preez during a ceremony at Swartkop on June 26, 1991
SAAF Museum Swartkop

6887[2] and 6891 (16276/33024). On April 3, 1998, the last of the squadron's TPs transferred out, bringing its lengthy Dakota association to an end.

Meanwhile, 86 MEFS based at Bloemspruit AFB began replacing its radial Dakotas with the TP version from July 1992.

Although it had been a large and lengthy user of the original Dakota its relationship with the converted platforms was limited and very brief in comparison. Known airframes were 6816 (12112), 6845[2], 6870[2], 6877, 6880[2] and 6887[2], sometimes for only a few weeks. By 1994 the last of its TPs had been withdrawn.

End of the road

Six years after the TP was introduced into service the first of the type was sanctioned for disposal with five airframes being put up for sale by public tender. Two were incomplete while three were sold as serviceable aircraft.

The following year saw the largest sale with 13 being sold, while between 1999 and 2003 a further four changed hands. Ten (included in the above totals) were disposed of as incomplete modifications. A number of these subsequently found their way to the US where a handful remain airworthy with other airframes being reduced to a source of spares.

Cape Town-based observers with an interest in the type had begun noting from 2020 onwards a steady decrease in Dakota sightings, with 6852 and 6887[2] being the serials most regularly recorded. A tender for provision of maintenance support on the C-47TP fleet through the Department of Defence's acquisition agency ARMSCOR closed on June 17, 2022, with no successful bid being registered.

It's understood the last flight of a TP in SAAF service was completed on September 22, 2022. A year later the Parliamentary Portfolio Committee on Defence and Military Veterans was told all TPs still on inventory were grounded due to challenges in finding a maintenance service provider, and there was very little prospect of them flying again. In May 2024, 35 Squadron personnel were advised the Dakota C-47TPs were being phased out and would not fly again. Although 6887[2] is still ground-run and appeared in excellent condition when seen on static display in October 2024, an official statement from the SAAF has not been forthcoming and there is no confirmation of preservation plans for any of the airframes. It would appear that after eight decades of service, the SAAF's long Dakota story has finally run its course.

With thanks to Ryno Joubert for additional information

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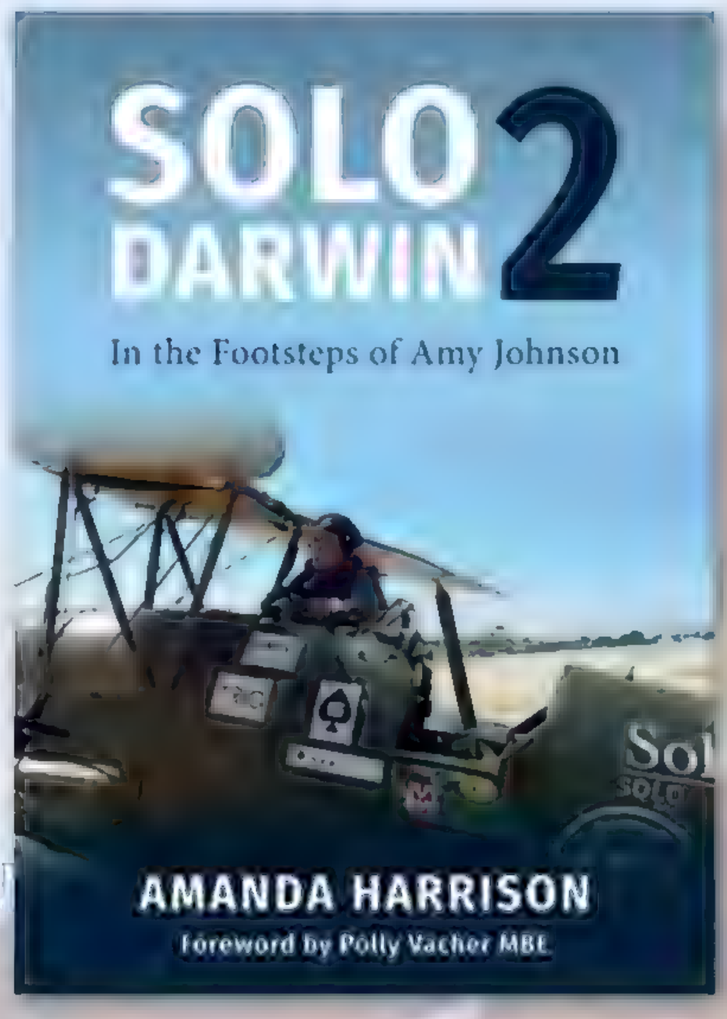

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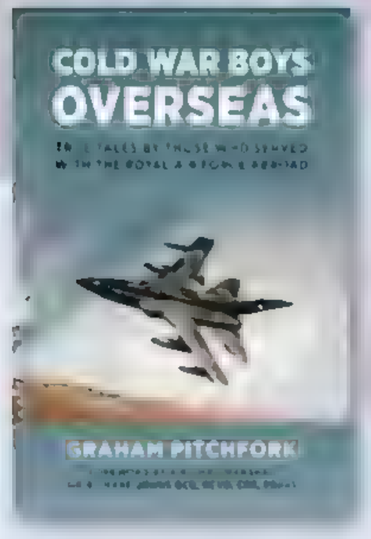

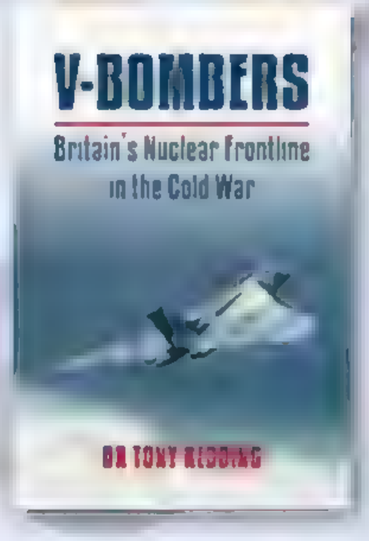

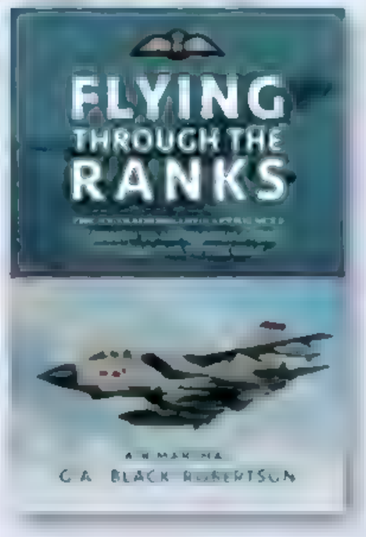

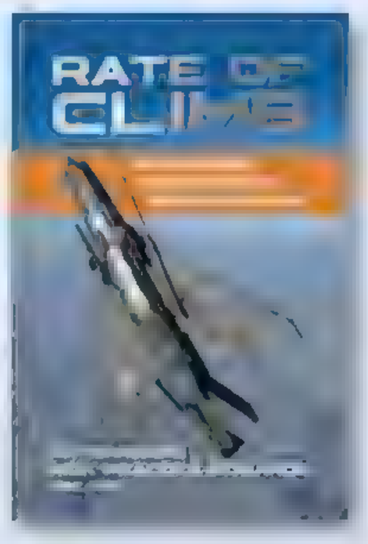

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GRUB STREET

HIDDEN GEMS

Babak Taghvee reports on the incredible collection of aircraft at the Melun-Villaroche Aviation Museum

The airfield at Melun-Villaroche, located some 20 miles southeast of France's capital, Paris, is bathed in a rich history dating back to World War Two when it was used by both the Luftwaffe and the United States Army Air Force. After the war, it was the turn of Dassault Aviation and the French Ministry of Armed Force's Flight Test Center (CEV) – both using the facility for the flight testing of fighters, equipment and systems for the French Air Force until the early 1980s.

It was then used by various flight schools, and more recently it's become home to one of the premier events on the European airshow calendar– the Paris Air Legend, traditionally held every September.

But what is less known about the airfield is the quite incredible collection of historic aircraft the Musée de l'Aviation de Melun Villaroche (MAMV, Melun-Villaroche Aviation Museum) boasts – many of which it inherited from the Association des Mécaniciens Pilotes d'Avions Anciens (Association of Vintage Aircraft Pilot Mechanics, AMPAA). Equally incredible is the hangar it calls home – it being designed by world renowned French civil engineer Gustave Eiffel, the man behind the Eiffel Tower.

Inheriting a collection

Dissolved in May 2021, the AMPAA was formed in 1981 by a group of pilots and mechanics assigned to the CEV. When the CEV closed its doors at Melun and transferred its operations to other airfields across France, it left behind a Mystère IVA (s/n 48) and a two-seat Mirage IIIB combat-trainer (202) that it had used for flight testing during the 1950s and 1970s, respectively – both are now with the MAMV.

During its 40-year existence, the AMPAA went on to gather an incredible collection of aircraft

Above
With airframes from across the spectrum of flight, this view of the MAMV's hangar reveals the signature large diagonal braces used by world renowned French civil engineer Gustave Eiffel
All images Babak Taghvee unless stated

Above
The MAMV's wonderful Latécoère 28 reproduction – the only such example of the type in existence

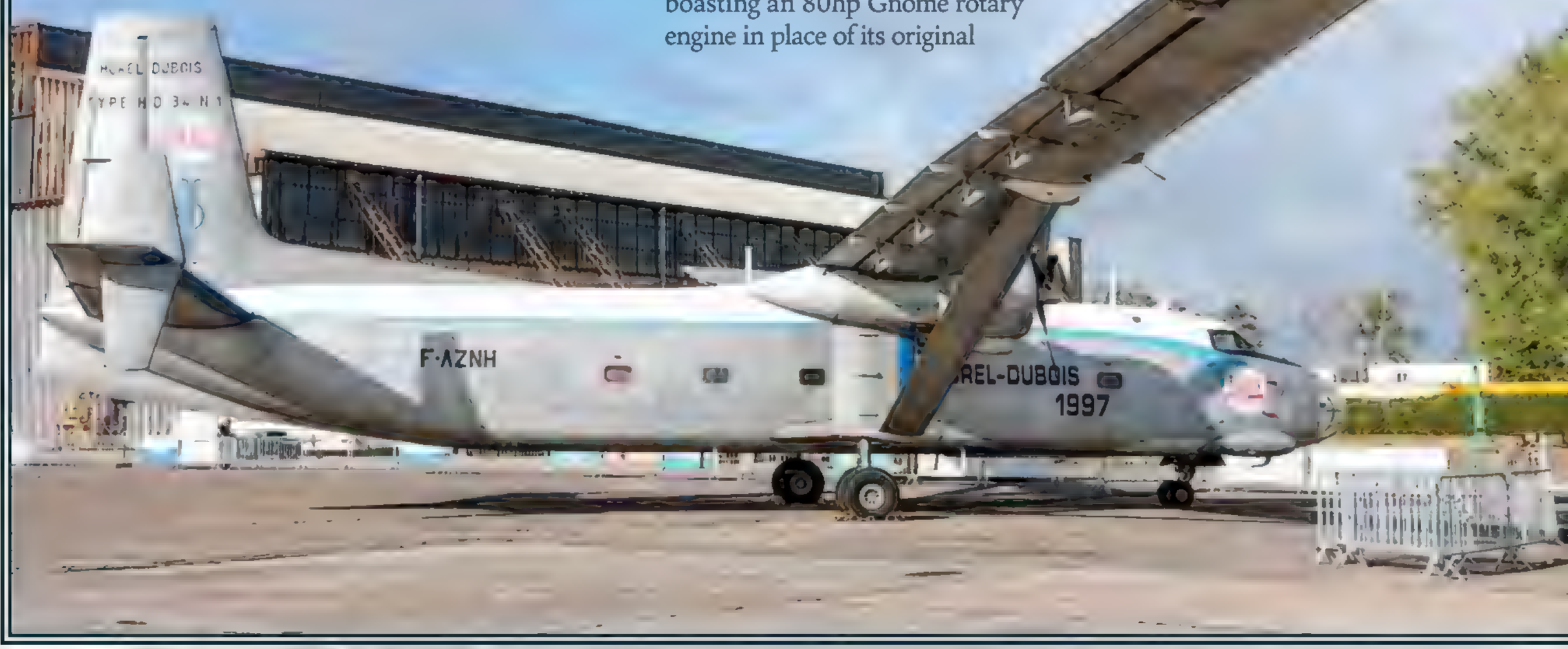
from around the world. Restoring most of them for static display, as well as some to airworthy condition, it also assisted countless aviation museums across France and overseas undertaking similar projects. The AMPAA also gathered aviation books, as well as technical, maintenance and even construction manuals, allowing them to rebuild severely damaged aircraft and even manufacture replicas of types no longer in existence. But like other similar associations and museums across France, the AMPAA faced budget issues, resulting in its dissolution in May 2021. By then, it had started transferring and selling airframes to other museums and private collectors. As a result of financial pressures, several of the AMPAA's ongoing and planned restoration projects suffered, leaving several wrecks and damaged aircraft in what is now the MAMV's hangar – including three ex-Royal Canadian Air Force's Bristol Bolingbroke IVTs (9889, 10040 and 10184), a North American B-25J Mitchell (45-8811/F-AZZU) and even an ex-Ethiopian Air Force Fairey Firefly T.2 (MB694).

Below
This view of the MAMV's 1956-built Hurel-Dubois HD-34 during a rare outing in the open reveals why the type was nicknamed the 'Bladecutter'

Filling the gaps

The AMPAA's members, many of whom continue to support the MAMV today, built several replica World War One-era aeroplanes using real parts, as well as the technical and construction manuals it had collected – including a Blériot XI (F-AZNB) boasting an 80hp Gnome rotary engine in place of its original Oberursel, a Farman F.40 (1801-2) pusher reconnaissance biplane and Fokker A.I (F-AYAI), an unarmed two-seat observation monoplane. These, along with an original SPAD S.VII fighter (1461) previously owned by French aviation pioneer Louis Blériot's grandson, form the backbone of the MAMV's Great War aircraft collection.

Another replica the MAMV boasts is a wonderful float-equipped Compagnie Générale Aéropostale marked Latécoère 28 (F-AJNQ) built for the 1980 Franco-Belgian mini-series L'Aéropostale, courrier du ciel (The mail from the sky). Later acquired by the AMPAA, it's the only 'example' of the type in existence. However, like most of the collection, these wonderful machines are kept hidden for much of the year.



"Equally incredible is the hangar it calls home – it being designed by world renowned French civil engineer Gustave Eiffel"

Vive la France!

As the time of writing in November 2024, three of the MAMV's aircraft were airworthy – although very rarely flown. They are a Morane-Saulnier MS.505 Criquet observation aircraft (F-BEJF), essentially a French licence-built Fieseler Fi 156 Storch, a former French Air Force North American T-6G Texan F-AZEF (ex-51-14387) and an SNCAN (abbreviated from Société nationale des constructions aéronautiques du Nord, more commonly known as Nord) 1002 Pingouin II (essentially a French copy of Germany's Messerschmitt Bf 108 Taifun) liaison aircraft (F-BAUF). Despite being deemed airworthy and having a working engine, F-AZEF has been grounded – its certificate of airworthiness having been withdrawn a couple of years ago.

The museum has several other airframes that, with an IRAN (Inspection, Repair As Necessary) maintenance schedule, could be returned to the sky. However, a lack of finances has prevented this. One of them is an ex-US Navy (USN) TBM-3E Avenger F-AZJA (ex-Bureau Number 85869). The Avenger in question, built by General Motors in 1943, was retired from USN service on August 24, 1955, and used as a fire bomber in the US between 1968 and 1981. It was later acquired by Justus O Jackson who restored it to its original military configuration in Texas between 1986 and 1988. Later transferred to France, it was delivered to the AMPAA on June 20, 1990.

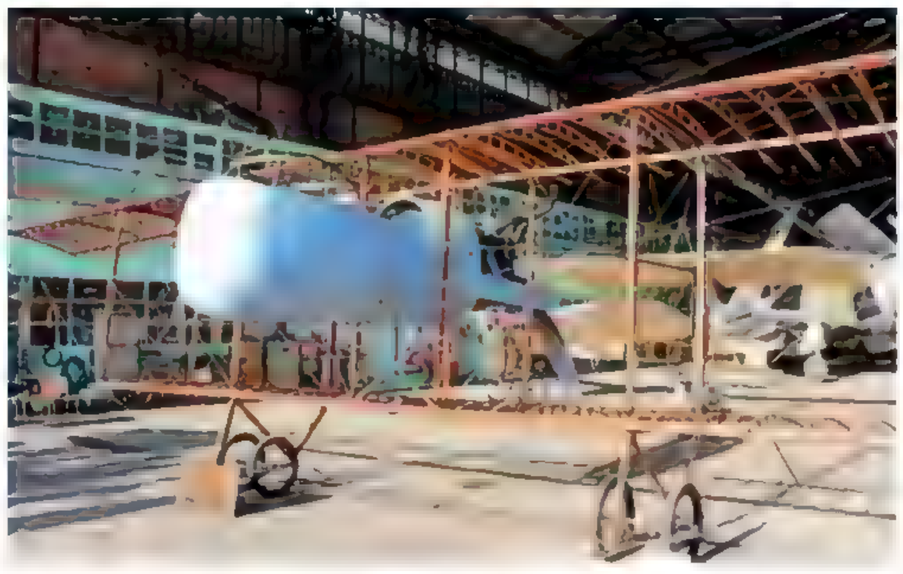
In the past, the AMPAA/MAMV has owned more airworthy aircraft or those capable of becoming flyable without any need for significant maintenance and repair. However, some of them were passed, sold or exchanged – including ex-French Air Force's Max Holste Broussard MH.1521 M (F-GOMH), an ex-French Air Force Nord N.1101 (F-GMCY), an ex-French Air Force's Nord N.1101 BR (F-BEEV), a Morane-Saulnier MS 733 Alcyon (F-BNEC), an ex-US Army Air Force's Curtiss P-40N-5-CU Warhawk *Little Jeanne* 42-105915 (F-AKZU) and an ex-French Air Force Douglas AD-4N Skyraider (F-AZFN). The latter was one of three examples the AMPAA discovered at N'Djamena International Airport in Chad during 1986. Restored to airworthy condition and ferried back to France in 1988, two ended up with other collections, while the AMPAA took on F-AZKY. Now in the care of the MAMV, it awaits restoration.

Today, the P-40N is part of the Melun-based France's Flying Warbirds (FFW) collection. It was built in August 1943 as 42-105915

Left
One of the very last aircraft to serve with the French Ministry of Armed Forces Flight Test Center at Melun, the collection's Dassault Mirage III, seen here tucked up in the MAMV's hangar, is a glorious reminder of the airfield's past

Left below
Dressed as a Luftwaffe Storch, the MVAM's former French Air Force Morane-Saulnier MS.505 Criquet gets airborne during the 2023 edition of the Paris Air Legend Airshow

Below
Severely damaged in a forced landing near Melun on May 31, 2011 and acquired by the AMPAA, North American B-25J Mitchell F-AZZU awaits restoration in the MAMV's hangar



Above
The MAMV's incredible Farman F.40 project on show within its equally incredible hangar during 2023's Paris Air Legend show
KEY-Jamie Ewan

Right
Douglas AD-4NA Skyraider F-AZKY was among the five former US Navy examples acquired by the French Air Force as replacement for its P-47D Thunderbolts in Algeria – it awaits restoration

Below
Paris Air Legend 2023 allowed visitors a rare glimpse of MAMV's ongoing Morane-Saulnier MS.406 restoration – the near-completed cockpit on display with the basic fuselage structure in the collection's hangar
KEY-Jamie Ewan

and was assigned to the USAAF's 7th Fighter Squadron in Papua New Guinea. Its pilot, Robert Warren, named it *Little Jeanne*. Abandoned with six other examples, it was salvaged in 1974, returned to the air in 2002 and exported to France by the AMPAA in 2007, before being transferred to FFW in 2011.

The MAMV houses two of the most historic and rare aircraft in existence: a former Portuguese Air Force Amiot AAC.1 Toucan, France's copy of Germany's Junkers Ju-52/3m (6311) and a Hurel-Dubois HD-34 (F-AZNH) – one of just eight examples of the pioneering long-winged type operated by France's Institut Géographique National (IGN, National Geographic Institute) for aerial survey and cartography work between 1958 and 1985. The fourth HD-34 manufactured, F-AZNH (formerly F-BHOO) ended up in the hands of the AMPAA, which kept the aircraft airworthy for more than two decades until its classification as a historic monument by Prefectural Decree No 2008/155 on December 15, 2008 grounded it.

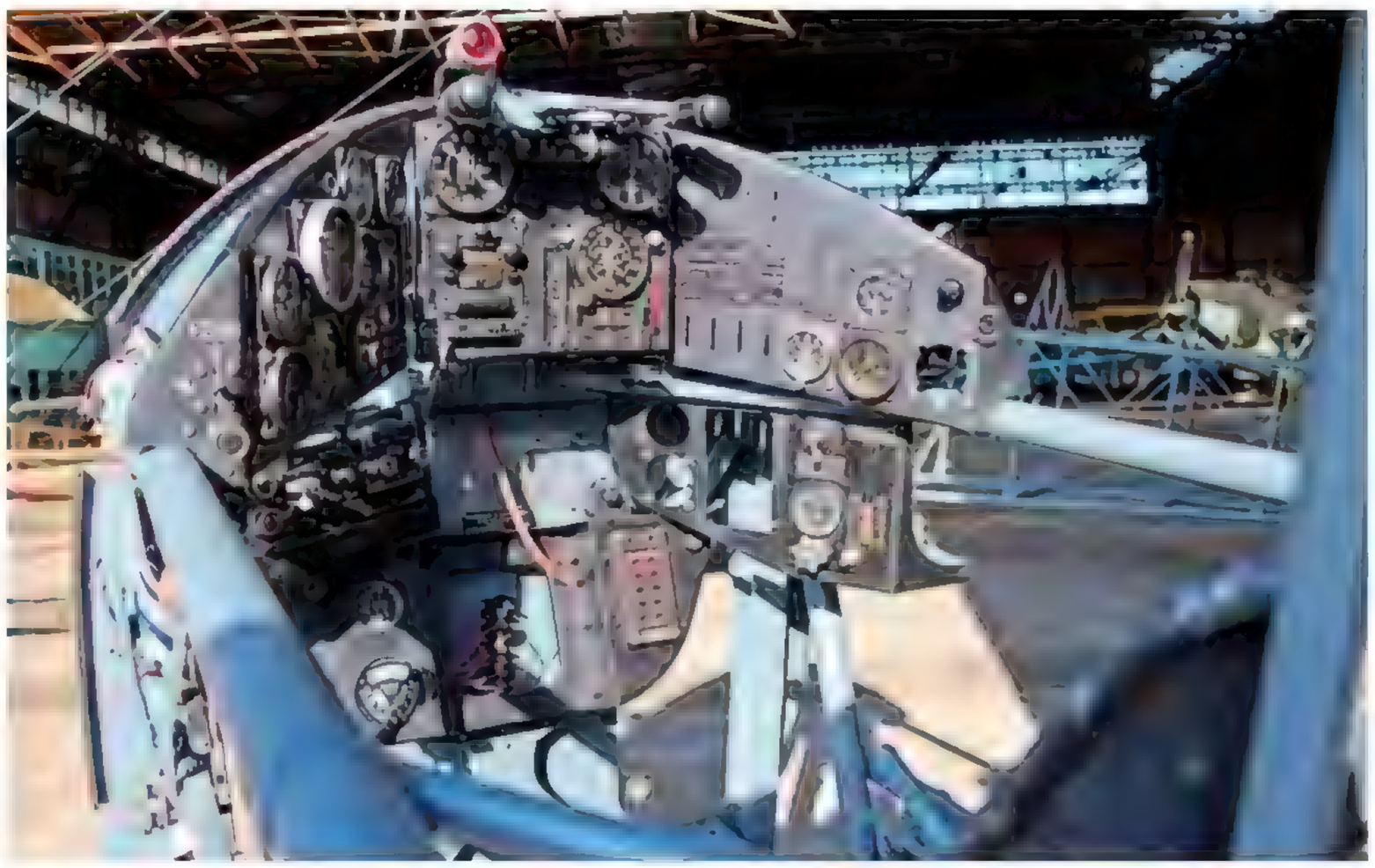
"Another replica the MAMV boasts is a wonderful float-equipped Compagnie Générale Aéropostale marked Latécoère 28"

Other airframes within the collection include a former Czech Air Force Avia B.33 (1087) – a Czechoslovakian licence-built version of the Ilyushin IL-10 Beast – undergoing restoration; a former French Air Force Fouga CM.170 Magister (F-HTKC); the significant remains of a V-1 flying bomb; and a pair of former Egyptian Air Force Gomhouria Bü-181 Bestmanns – one preserved (321) and the other (152) undergoing restoration.

As mentioned, the MAMV's aircraft are kept hidden from public view for most of the year. That said, several have been seen during the resident Paris Air Legend airshow.

During the latest edition of Air Legend, which took place on September 14-15, 2024, the MS.505 Criquet flew in the display, while a number of other aircraft were placed on static on the flightline, and at the entrance of the MAMV's hangar. These included the Avenger and the Pingouin II, as well as the MAMV's ongoing Westland Lysander IIIA and Morane-Saulnier MS.406 (46) restoration projects.

With 32 aircraft, two gliders and countless rare engines, as well as other valuable equipment, parts, books, documents and photographs, the MAMV currently holds one of the finest aviation collections in the world. And, with the allocation of funding from government institutions, along with public support, it can continue to be preserved for future generations. Despite financial struggles, the MAMV's mechanics and engineers work to do their best to uphold the finest traditions of four decades of preservation laid out by the AMPAA.



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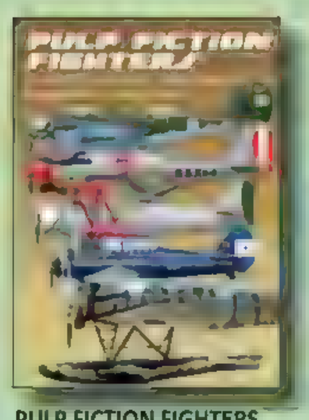

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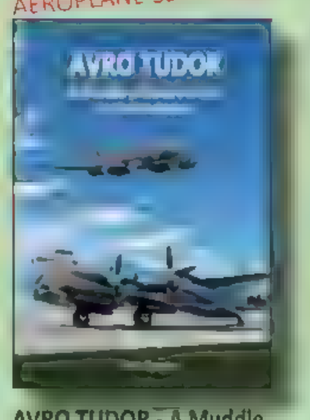

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The bomber by night

Mention the word 'Duxford' and it exudes history. Considered by many to be one of the most significantly historic places in aviation not only in the UK, but the world, it is incredible to think the Cambridgeshire airfield continues to make history more than a century after it welcomed its first aeroplane.

History was made during the Imperial War Museum's 'Duxford in a Different Light' nightshoot on October 4, 2024. Despite the night's line-up boasting a pair of Battle of France veterans – IWM's own Spitfire Mk.I N3200 and Fighter Engineering Aviation's Hurricane Mk.I P2902 – perhaps the best looking Mustang in Europe, *Jersey Jerk* (another of Fighter Engineering Aviation's machines), and the immortal lines of a Royal Indian and USAF-marked Spitfire – Fighter Engineering Aviation's FR.XIV MV293 and The Suffolk Spitfire's Mk.IX RW382 *Porky II* – it was a World War One-era bomber making the type's first appearance in public at night this century that stole the show: the Historic Aircraft Collection's Airco DH.9 E8894. *FlyPast*'s Jamie Ewan shares images of this majestic biplane, one of the first type to call Duxford home when it became operational in 1917.

Above
Respected re-enactor and all-round nice guy Jed Jaggard of Up An' At 'Em! History poses with E8894 on October 4, 2024. One can imagine similar scenes being played out across the airfield when the type was based at Duxford more than century ago *All images KEY-Jamie Ewan*

Above right
It is incredible to think this is the same machine discovered rotting away in the elephant stables of a maharajah's summer palace in the Indian city of Bikaner. Recovered and returned to its former glory by Guy Black of Retrotec, it is a modern-day marvel of restoration

Below
A World War One bomber lit up outside a World War One hangar? What's not to like? The Historic Aircraft Collection's DH.9 made what is thought to be the first public appearance of the type at night this century

Above
A pair of Mirage F.1CZs from 3 Squadron taxi at Langebaanweg. This view reveals the type's ungainly squat Cobus Toerien Collection

The Caterpillar Club, started by the Switlik and Irvin parachute companies, is a rather special one. Once the requirements have been met, becoming an official member is a simple matter of choice, then filling in a form or two. However, the path to eligibility is less a matter of choice than of survival, as this club is reserved only for those who have been forced to take to the silk of a parachute to save their lives.

During the 1960s and 1970s, the French-built Dassualt Mirage III was pitted against Soviet-built Mikoyan-Gurevich MiG-17 *Frescos*, MiG-19 *Farmers* and MiG-21 *Fishbeds* in various conflicts across the skies of Africa and the Middle East. These clashes between MiGs and Mirages resulted in numerous new qualifiers for the Caterpillar Club.

In African skies

In 1975, the South African Air Force (SAAF) took delivery of the very capable Mirage F.1. As sleek and menacing as it was, it didn't have the same classic French beauty and elegant lines of the delta-winged Mirage III. Even more importantly, it didn't yet have the combat pedigree its predecessor had built up in various conflicts since entering worldwide service in 1961.

In the typically fierce rivalry between fighter pilots flying different types, these facts weren't lost on the SAAF's Mirage III airmen. They also couldn't ignore the Mirage F.1's small shoulder-mounted wing with its high loading and massive drooping anhedral or its long and complex main undercarriage, the legs of which were angled forward from the fuselage, giving the design a characteristic frontward crouch. This combination of wing shape and undercarriage design made the F.1 appear quite gawky on the ground, almost akin to a bird crouching on a perch. As one SAAF Mirage III pilot put it: "That F.1 looks like a chicken with Newcastle Disease!" (one of the primary characteristics of this avian malaise is the way in which it causes the fowl's wings to droop). The comment stuck and the F.1 became known as the 'Newcastle Chicken' among the South African Mirage III pilots. In time, though, the F.1 would silence its critics and become one of the most respected types in SAAF history.

coming of age

Lionel Reid reveals the first combat sortie between South African and Cuban fighters over Angola in 1981, recounting how a South African pilot flying a French jet achieved a 'kill' against a Soviet-built fighter flown by a Cuban pilot

By 1981, the SAAF Mirage's primary opponent was the MiG-21MF. The latter were survivors of the original batch that had arrived in early 1976 for Operation Carlota, Cuba's intervention in the Angolan civil war. Late-production model MFs, they boasted a less cluttered cockpit and better forward visibility than earlier models. This same cockpit layout was also used in the variant that followed the MF – the MiG-21bis, examples of which began to arrive in Angola during 1981. The type's ultimate development, the MiG-21bis was optimised for air combat with a new innovative two-stage afterburner, which endowed it with a superior power-to-weight ratio. However, it's use was limited to a maximum of just three minutes to preserve the life of the engine. Moreover, in this afterburner regimen, the fuel consumption was as extraordinary as the thrust – a pilot probably wasn't going to make it back to base if he had to use it for any longer. Interestingly, the MF remained the mount of choice for Cuban pilots flying ground-attack missions. Although there was no difference between the two variants' maximum dry thrust, the MF was lighter.

Through the early 1980s, the South African Defence Force (SADF) made numerous excursions into southern Angola, including Operation Daisy in November 1981. Militarily, the operation would be one of the less successful ventures for the SADF, but it would form the backdrop for a significant aerial encounter.

With the Mirage F.1CZs of 3 Squadron deployed to Ondangwa Air Force Base, situated between Etosha Pan and the Angolan border with South West Africa (now Namibia), they were tasked with providing the SADF air support. On several occasions, MiGs had been picked up on radar approaching areas where the South African forces were operating. But whenever the F.1s were scrambled, the MiGs withdrew.

Operating out of Lubango, about 300km north of the border, one of the Cuban MiG pilots involved was Lt Danasio Valdés Espinosa, then a young and inexperienced aviator with a rating of Pilot Third Class and just 250 hours in his logbook. Unsurprisingly, he was finding the war a big step up from anything he'd experienced before. On the morning of November 6, he was scheduled to fly a combat air patrol (CAP) in support of a special forces

Above
A 3 Squadron Mirage F.1CZ on alert at Ondangwa circa 1981. Note the wingtip mounted Matra R.550 air-to-air missile 3 Squadron Collection

raid against a suspected National Union for the Total Independence of Angola (UNITA) base south of Lubango. He recalled: "The raid would be done before first light and some of the troops would be deployed by helicopter. Our MiGs were then tasked to fly a CAP overhead this area from sunrise. I was rostered to be the wingman in the second pair of MiGs to take off."

The leader of that second pair was Lt Ezequiel Cancela, one of the less experienced flight leaders with some 330 hours of flight time. For this mission they would be flying the older MiG-21MF. Valdés explained: "In the days preceding the raid, some of our MiGs had been threatened by Mirages that were picked up by our ground-based radar systems. In preparation for possible air-to-air combat against the inbound enemy aircraft, some of the aircraft had jettisoned their fuel tanks. Although no combats had yet taken place, it meant that Lubango had become short of drop-tanks. So that day we were configured with only a single centreline drop tank and AA-2 missiles on the wings." The AA-2 was a short-range, infrared homing air-to-air missile developed by the Soviet Union and designated the Atoll.

To the south at Ondangwa, 3 Squadron's Mirage pilots were becoming frustrated with the MiGs' tactic of withdrawing before they could be engaged. So, they changed their approach. Major Johan Rankin, one of 3 Squadron's senior pilots, recalled: "The MiGs had been intimidating the South African ground forces by bombing them when they detected the dust from our artillery firing at targets close to Cahama. Early that morning, I was on cockpit stand-by along with Capt Johan du Plessis when I was called to the telephone – it was one of our fighter controllers, Maj Marsh Facer. He did not want to speak over the radio for security reasons. He had detected a MiG CAP over our artillery to the southeast of Cahama. We agreed on running low level into the area, maintaining complete radio silence and without any radar coverage or control. There would be a point once we had passed Xangongo [about 55 miles southeast] where we would suddenly pitch up back into our radar coverage and hopefully surprise the MiGs."

Into battle

Scrambling out of Ondangwa armed with a pair Matra R.550 infrared guided air-to-air missiles and 150 rounds for each of their two 30mm DEFA 553 cannon, the Mirage F.1s used the contours of the Kunene River to stay below Cuban radar as they raced at low level

"This new fighter didn't yet have the combat pedigree of its predecessor"

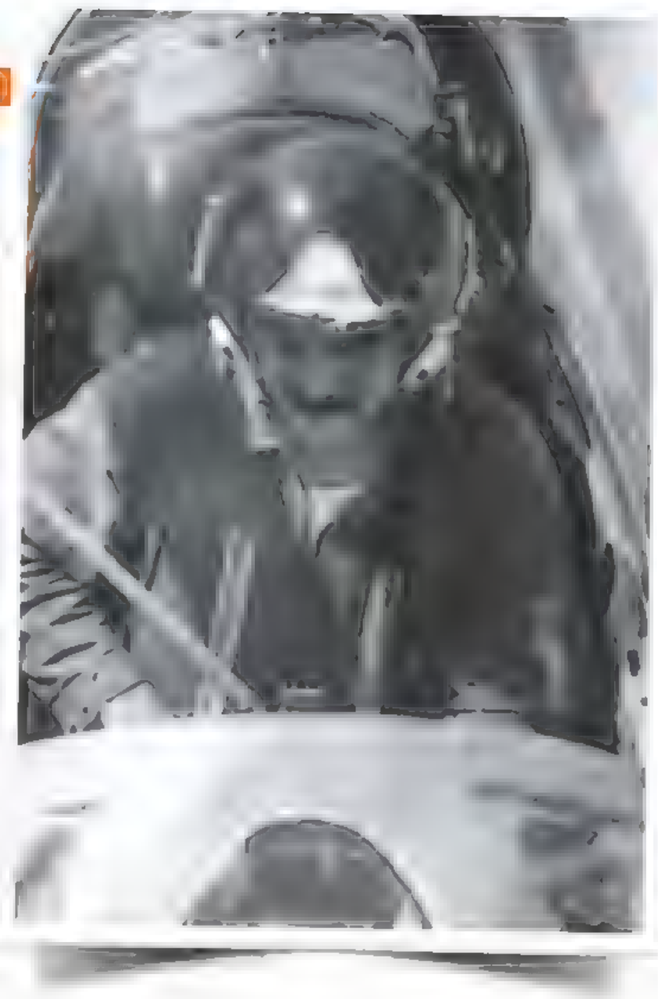
Right
Mirage F.1CZ 213 in the Deep Buff/ Olive Green camouflage over Light Admiralty Grey scheme it was wearing on November 6, 1981
Paul Dubois Collection

towards the unsuspecting MiG-21s flown by Ezequiel Cancela and Danasio Valdés. Valdés later recalled: "At first, we were under the control of Lubango and they started vectoring us towards two incoming blips from the south. My flight leader was then instructed to switch over to the Matala radar control frequency. The [radar intercept officer] at Matala was also a new guy, and the air-to-ground communications were a challenge, with lots of overlapping transmissions. He vectored us to within 7km of the blips before he lost them on his radar. The blips were faint and we thought they were spurious radar returns."

Rankin explained: "I was on the left-hand side, with Johan du Plessis to my right, when we pitched up. When our radar controller detected us on their screens, they reported the MiGs at our 11 o'clock at ten miles, and above us at approximately 25,000ft."

When in combat formation, the Mirage pair would fly abeam each other approximately a mile apart, with each pilot responsible for scanning the area behind and above their wingman. As such, the aircraft on the right would scan the sky to the left of the formation and vice versa. The MiGs were in the section of sky that Du Plessis was responsible for scanning. He didn't let the team down, spotting the enemy jets at their 10 o'clock at five miles. Rankin continued: "Johan got them visual first and reported their position. To counter the MiG on the left, I turned in behind it while still climbing to their altitude, but the angle into the sun was preventing the Matra missile from locking on. Instead, I used my 30mm cannon, opening fire at approximately 550 metres. The MiG started turning gently left as it began trailing smoke or vapour."

The MiGs had indeed been caught unawares by the Mirages. Valdés suddenly felt his jet shudder as cannon fire tore through it: "First, I felt a sort of thud that seemed to project the aircraft forward. Then the engine flamed out and I lost one of the hydraulic systems.



Left
A Cuban pilot straps into the cockpit of an Angolan MiG-21
Milton Diaz Collection

I looked back in the mirror – that's when I saw a Mirage."

At this stage, the Mirage pair split up with Du Plessis going after Cancela in the lead MiG, while Rankin concentrated on Valdés: "I moved into a high yo-yo position, as I was closing fast on my MiG. Johan pursued the lead MiG, who had reversed to the right and went down in a Split-S manoeuvre. The wingman in the meantime reversed to the right and was entering a position from which he could possibly threaten Johan. I descended on his circle and fired a second burst – the MiG exploded and broke in two."

Inside that MiG (serial C-41), Valdés realised the jet was doomed when the second burst struck his aircraft. "I'm hit... They are behind us... I'm ejecting!" he screamed on the

Left
Cuban ground crew prepare Angolan MiG-21bis C-315 for its next sortie at Menongue Milton Diaz Collection

Below
Champagne in hand, Johan Rankin (left) is congratulated by Jack Gründling for his historic 'kill' following his return to Ondangwa on November 6, 1981

Above
Following the successful engagement, Mirage F.1CZ 213 was decorated with a 'kill' marking under the cockpit Paul Dubois Collection

Above right
Stills from Johan Du Plessis' gun camera footage shows Ezequiel Cancela jet eluding him – the MiG-21's profile is unmistakable Paul Dubois Collection

Right
Stills from Johan Rankin's gun camera footage show the demise of Valdés' MiG-21 on November 6, 1981 Cobus Toerien Collection

radio to Cancela. As he pulled the ejection seat handle, the MiG broke apart. But the Soviet-built KM-1 ejection seat did its job and saved his life, shooting him clear of the disintegrating jet.

He did not escape unscathed. As the seat propelled through the inferno, pieces of steel – possibly shrapnel from a 30mm round – as well as shards of aluminium battered his torso, throat and right arm. The ejection sequence itself went smoothly, and soon Valdés was safely suspended underneath the canopy of his parachute. He had just become eligible to join the Caterpillar Club. Rankin watched his opponent escape the doomed MiG: "After another 180° turn, I saw his parachute opening approximately 10,000ft below."

In the meantime, Du Plessis had followed Cancela down, but couldn't achieve a missile lock or get close enough to use his guns. Rankin called him to break it off, and the two formed up and returned to Ondangwa. Cancela's high-G spiral had allowed him to evade the Mirages and escape back to Lubango.

Turbulent times

Danasio Valdés' day was not going to get any better. Descending into a forest, he landed in a tree. Eventually managing to release his parachute harness, he fell to the ground, landing heavily and injuring both ankles. At this point, the extent of the injuries sustained in the ejection became apparent. His chest, throat and right arm had been peppered by more than 30 fragments of shrapnel. When those in his right arm were later removed, they would prove to be almost all aluminium – likely from his disintegrating MiG-21's fuselage. Incredibly, his metal dog tags on his chest had absorbed the impact from one of the larger steel fragments, protecting his vital organs. The damage to Valdés' right arm had disabled it, creating challenges for the right-handed pilot. He tried to open his survival pack, but with just one arm could make little progress. He then squeezed it between his knees, using his left hand to cut the pack open with his knife – a clumsy process that ended with him not only opening the

Right
Pencil study of a pair of 3 Squadron Mirage F.1CZs taxiing out for a mission at Ondangwa was produced by former SAAF fighter pilot Sean Thackwray Sean Thackwray

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Above
A delightful aerial study of Mirage F.1CZ 213 in the air superiority blue/grey scheme during her later years with 3 Squadron Charl Durandt

survival pack, but also severing the electrical cord to the antenna of his emergency locator beacon, rendering it useless.

Finally, a stroke of luck. Flying another MiG, Albo Parra Salinas had been vectored to the area. Spotting the inverted wreck of the MiG-21 in the forest, he called the rescue helicopters. Some two hours after ejecting, Valdés heard the welcome thud of rotor blades.

Meanwhile, on returning to Ondangwa, Rankin executed a well-deserved victory roll over the base –the 'Newcastle Chicken' had finally come of age. Rankin had achieved the first confirmed air-to-air kill by a South African pilot since World War Two. It was also the Mirage F.1's first air-to-air kill anywhere in the world – although more were imminent, including Iraqi F.1s downing Iranian Grumman F-14A Tomcats later thet same year.

Valdés logbook entry for November 6, 1981, notes a 17-minute flight with no approaches or landings. In the comments, he wrote: "Two Mirage IIIs, ejection in combat, hit by two air-to-air missiles." In the often-confusing world of high-speed jet combat, he had been mistaken about both his foe and the method of the 'kill'.

For Valdés, the coming weeks involved operations and skin grafts, with the Cuban doctors managing to remove most of the metal fragments lodged in his arm and torso, although with some shrapnel remaining, Danasio Valdés and his MiG would always be a part of each other. That said, he would once again climb into the cockpit of a MiG-21 and return to the Angolan conflict in 1985, going on to become a respected stalwart of *Fishbed* ground-attack operations, forming part of a well-known quartet of MiG-21 pilots who dubbed themselves the 'Trunk Four'.

Johan Rankin would also return to Angolan skies for future Mirage tours and Valdés's MiG would not be the last to appear in his gunsight, but that's a story for another time.

* Lubango, previously Sá da Bandeira
† Huambo, previously Nova Lisboa
‡ Menongue, previously Serpa Pinto

Map of Angola

Below
Photo taken by Cuban war correspondent Milton Diaz around 1985/1986 of the 'Trunk Four' shows Danasio Valdés on the far right Milton Diaz Collection

The events described here took place during an undeclared war in Angola near the small town of Mulondo. This feature is an adapted account of the engagement as described in Eduardo González Sarria and Lionel Reid's 2023 book *The MiG Diaries: Fighter Pilot Memoirs & Accounts of Cuban, SAAF and Angolan Air Combat in Southern African Skies*

A DAY AT THE FAIR

What should have been a day of fun and excitement ended in disaster, as **Bernie Runstedler** explains

For anyone who grew up in a small town in Canada, autumn always brought with it the excitement of a fair. There were the usual livestock shows, baking contests, maybe a beauty pageant and sales of local wares, but the competition to draw fairgoers was so fierce that sometimes something very exciting was added. Such was the case in Shawville, Quebec, back in the autumn of 1920.

Shawville is located about an hour's drive northwest of Ottawa. It is almost directly across the Ottawa River from Renfrew, Ontario, where, in 1920, they were hosting their Fall Fair on the same days. Facing such competition, the Shawville Fair Society decided to hire an aircraft for its 64th annual event, to take passengers up for rides.

In those early days of aviation, an aircraft could still draw a big crowd, especially if rides were offered. Back then, even the sight of an aircraft was a rare experience for the general public, and the opportunity to take a passenger flight was beyond the reach of the vast majority.

Jack Drummond and his brother Pete were from Spencerville, Ontario, about an hour's drive south of Ottawa. Along with Gordon Eckhardt, they had recently purchased an ex-military biplane and formed the Drummond-Eckhardt Commercial Air Service. The aircraft was an ex-military Curtiss JN-4. Plenty of these war-surplus machines were available, making and them very affordable.

The JN-4 was manufactured by the Curtiss Aeroplane and Motor Company of Buffalo, New York, but built by Canadian Aeroplanes Limited in Toronto. Being a Canadian-built example made it a JN-4 (Can) Canuck, rather than a 'Jenny' as the US-built airframes were known. Its construction serial number was 437 and it was placed on the civilian register as G-CADI. It was powered by an eight-cylinder, liquid cooled Curtiss OX-5 engine that produced about 90hp, roughly equivalent to the power produced by the four-cylinder, air cooled Continental O-200 found in today's Cessna 150s. The aircraft was flown in Ottawa by a Flight Lieutenant Bradfield until it was damaged during a windstorm in 1919. Rebuilt with new wings, it was sold to the Drummonds and Eckhardt, who kept it at Allen Brothers Farm, close to the present-day Royal Ottawa and Champlain golf courses in Aylmer, Quebec.

Jack and Gordon were ex-RFC pilots. Jack had transferred from the 4th Hussars to the RFC in 1917. He trained then flew with 100 Squadron, seeing action in Belgium and France in World War One. Gordon is believed to have graduated from the Curtiss Aviation School in Toronto late in 1916, before joining the RFC in 1917.

The Drummonds and Eckhardt were awarded the two-day contract to fly passengers at the Shawville fair, for which they would be paid $100. On the Tuesday morning, Jack flew the JN-4 from Aylmer, Quebec to Shawville. A field was selected on the east end of town for take-offs and landings; it was just down from the fairground and across the train tracks, within easy walking distance for visitors.

On the first day of the fair, the crowds were good and the weather was perfect. Unfortunately, Imperial Oil did not show up with their supply of gasoline and a local White Rose dealer had stepped up to provide the necessary fuel. Jack took delighted

Above
Having carried the military serial C-437, Curtiss JN-4 Canuck was sold off as war surplus and entered the Canadian civil register as G-CADI Courtesy Canadian Aviation and Space Museum

Left
None of the contemporary reports record the colours worn by the ill-fated aircraft, so they can only be guessed at using the available black-and-white photography as a guide Andy Hayl Flyingart

Right
Lt John L Drummond of 100 Sqn, Royal Flying Corps Canadian Aviation Historical Society

Far right
Adverts for the competing town fairs published in the Shawville Equity on September 16, 1920 Via author

passengers for short flights of approximately ten minutes each. At $10 per person, the day proved quite lucrative and the flyers looked forward to a second profitable day.

Disaster strikes

On the morning of Wednesday, September 22, the weather was good for flying and Jack had the first passenger aloft by 1100hrs. Two more flights followed, with the fourth to take place at 1330hrs, when Mr Ernest G Amey, a Shawville jeweller, was to be the passenger.

Amey was a veteran of World War One, having served in the 44th Battalion Canadian Light Infantry. Wounded in Flanders on two separate occasions, he had spent a considerable amount of time convalescing in Britain before returning to Canada. Amey wanted to fly up to Fort Coulonge, Quebec, and be dropped off for which he was prepared to pay $15. However, when the pilot was told, he said he did not want to land there and Amey agreed to settle for a local sightseeing flight and was refunded $5.

After uplifting an additional five gallons of fuel, the aircraft made an uneventful take-off at 1333hrs. Eyewitnesses accounts reported in the *Shawville Equity* newspaper said: "The plane sailed over the fairgrounds in a northwesterly direction, it climbed to about 1,500ft, hovered, the nose dipped, the engine died and a spiral dive ensued. After several 'twirls' the aircraft did not recover."

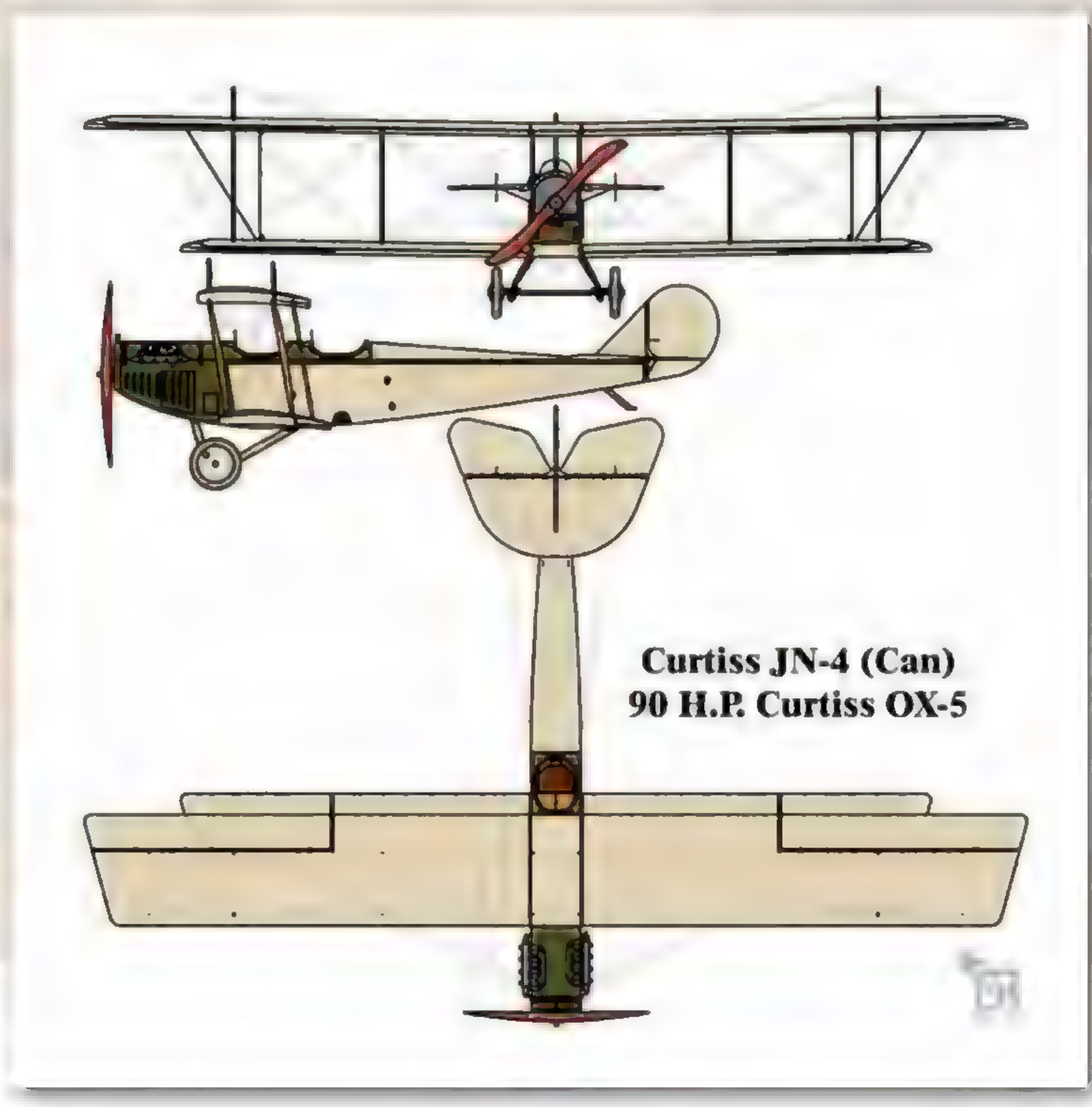
The landing gear hit and severed four telephone lines. The impact turned the aircraft onto its back, but its momentum caused it to flip upright again before coming to rest. Its nose was enveloped in bushes, while the tail lay across the Rue Centre, north of the railway tracks (the railway line is not visible on the modern photograph because it was removed in the 1980s).

The JN-4 has an open cockpit and its fabric-covered wooden frame enabled rescuers to tear away parts of the wreckage and release the pilot and passenger. Drummond was injured, but Amey's life hung in the balance. He was taken to his brother-in-law's house, where he died about seven hours later.

Jack Drummond spent an uncomfortable night locally but, in the morning, accompanied by two nurses and his brother Pete,

Below
The crash aircraft, G-CADI, at its base – a farm between the town of Aylmer and the city of Hull, Quebec – in September 1920. The two men in this picture are unidentified Courtesy Canada Aviation and Space Museum

Below right
The Canadian-built JN-4s carry the designation JN-4 (Can) Canuck Nid 29 CC 40



was taken by train to a hospital in Ottawa, his wife meeting the incoming train when it arrived. Eckhardt stayed on in Shawville to salvage what he could from the JN-4. Souvenir hunters had already swiped a great deal from the wreckage, including the joystick, most of the right upper wing and numerous small parts. Because the wreckage was blocking a main road, it was moved about 20ft. Eckhardt removed the engine, tailplane, rudder and some instruments before representatives from the recently formed Canadian Air Board (CAB) arrived, thereby making the subsequent accident investigation far more challenging.

In hospital, Jack Drummond was found to have a broken right hip and numerous cuts and bruises. He was facing several weeks in hospital, but would live. The Globe newspaper quoted him as saying: "I would fly again tomorrow if my leg was in shape."

Inquiry

On September 27, the CAB's Air Commodore Arthur Tylee announced that its Board of Inquiry into the crash would be held in Shawville and be directed by Captain Mostyn Lewis of Montreal and his appointed personnel: Flight Lieutenant GR Long, Flight Officer GHM Fleming and Pilot Officer FW Davis.

The inquiry lasted several weeks and eight witnesses were called. Its findings, released on October 9, stated that although Drummond had only slightly more than 350 flying hours experience, gained mostly on six different military aircraft types, he held a valid Commercial Pilot Licence and an Air Engineering Licence. Including his flights in Shawville, he had 24 hours total time on the JN-4.

The aircraft had been inspected and certified airworthy on the very day of the accident. All air regulations had also been complied with and the aircraft was well below in its maximum permissible gross weight. Because of the extensive damage from the crash, it was impossible to examine the controls thoroughly, but the Court of Inquiry decided the accident was due to the "jamming of the control column."

The *Shawville Equity* reported that immediately after the crash, Drummond had told Eckhardt he lost control because the rudder bar and rudder post had broken. He had pressed it so hard with his left foot, the bar snapped. He was able to grab the connecting cable and gain some control and felt he could have recovered had his undercarriage not hit the telephone lines.

In an interview published in *The Globe* on September 20, Peter Drummond chastised the Pontiac Fair officials. He felt that better security and crowd control should have been observed. Damage to the aircraft, especially "twisting of the tail by the throngs of children who swarmed the 'plane after each landing" may have occurred. The story made headlines across Canada, all the way to Vancouver. The *Ottawa Citizen* ran an editorial condemning "stunt flying at fairs", suggesting that it would destroy public confidence in aviation. It did not directly criticise Drummond, but it did say that that type of flying should be "against the law."

Exonerated

The CAB Inquiry exonerated Drummond, saying he was not "stunt flying." He continued to live in Ottawa and stayed in the militia, eventually attaining the rank of major. The aircraft was written-off, but parts of it were salvaged and used to rebuild another JN-4.

So what else might have contributed to the accident? Today, we would say that Drummond had experienced a stall/spin. Most pilots know that to recover from a power-on stall/spin, the first thing you do is lower the nose, then pull back the power. To those

"At $10 per person for a flight, the day proved quite lucrative"

Above
John Drummond (right) and his mechanics with the Curtiss JN-4 in September 1920. Although unconfirmed, the mechanics are probably Gordon Eckardt and Drummond's brother Peter
Courtesy Canada Aviation and Space Museum

CANADIAN AIR BOARD

The Canadian Air Board (CAB) was formed in 1919 to oversee all civil and military aviation and gave federal control to aviation and air regulations. It was responsible for authorising an aircraft's airworthiness and issuing all pilot and air engineer licences. It gave the first Canadian Commercial Pilots Licence to Roland Groome of Regina, Saskatchewan, in April 1919. In 1922, it was announced that the CAB would be combined with Canada's Department of Militia and Defence and the Department of Naval Service to form the Department of National Defence (DND), although the official changeover date was January 1, 1923. The civil aviation element was a forerunner of today's Transport Canada.

Above
An aerial view of Shawville today from 1,700ft, showing the take-off point to the right and the crash location on the left

Far right, top
Photo of G-CADI's wreckage taken by Jack Lester before it was moved from the original crash site Library and Archive of Quebec

Far right, bottom
A JN-4 rudder bar. It was determined that the crash aircraft's rudder bar broke, leading to a spin and the crash Via author

watching on the ground, this would sound like the engine had cut out (although Drummond maintained there was never any issue with the engine). Next, you had to level your wings, applying and holding full rudder in the opposite direction of the spin. All this would have to be done quite rapidly to keep the aircraft from going into a fully developed spin.

However, the Operating Instructions for the JN-4 were a bit different. They state: "The only available control is the rudder, and this is your friend." They go on to say: "Put both feet on one side of the rudder bar. Remember to hold that rudder and keep the motor going full to supply all the possible air blast." Unfortunately, with a broken rudder bar, Drummond went into a nose down, full spin.

It was unusually warm that September day. Records show the afternoon temperature was 26.7°C, which would have markedly affected the density altitude. A high density altitude, as on that day, would have resulted in less lift being generated by the wings. The propellor would perform less efficiently and the rate of climb would be reduced, as would the horsepower being produced by the engine. With the less dense warm air at take-off, and with Drummond attempting to climb higher into even less dense air, more lift would need to be generated by an aerofoil to sustain flight. This would cause the true air speed at which his wing would stall to increase.

Did Drummond have enough experience on the JN-4 to know this? He only received his Commercial Pilot Licence on August 27, 1920, just a few weeks before the fair. Was he tired? He had performed ten flights the previous day and another four the morning of the accident. Was there a flaw in the rudder bar that caused it to break? When the wings were exchanged after the windstorm, were they from the correct model? Were the tail and rudder actually damaged by the crowds closing in on the aircraft after every flight? Was the quality of the fuel he acquired form the White Rose dealer equivalent to the Imperial Oil supply?

Looking back on the accident over 100 years later, it is easy to assume quite a bit. I was not there, but I have visions of the chaos Drummond faced in the cockpit on that fateful day. I'm amazed he had the foresight to grab the rudder cable with his hand and almost get the aircraft leveled to make a safe landing. Given a few more feet of altitude, he might have pulled it off. Ironically, even today, stall/spin events are one of the most common causes of aircraft accidents.

The Curtiss JN-4 was a very safe aircraft. Thousands of pilots, all around the world, did their initial training on it. Canada's first licenced female pilot, Eileen Vollick, did her training and successfully passed her flight test on a JN-4 at Hamilton, Ontario, in March 1928.

I also give great credit to the early Canadian Air Board and the obstacles it faced. Originally overseen by the Department of National Defence, Civil Aviation Branch, it has evolved into the Transportation Safety Board of Canada. It is through its tenacity, thoroughness and recommendations that we can learn from, rather than reproduce, accidents.

Right
Air Commodore Arthur Tylee announced the Canadian Air Board's official crash investigation on September 27, 1920
RCAF/DND

HANDS ON AT SHUTTLEWORTH

As the Shuttleworth Trust launches its 2025 Engineering Apprenticeship Scheme, Head of Engineering **John Munn** tells *FlyPast* how youngsters with a passion for aviation can carve out a career with Shuttleworth's world-renowned collection

Above
When you are on the outside looking in, it may appear that an engineering career with historic aircraft is out of your grasp, but the Shuttleworth Collection's apprentice scheme is open to 17-year-olds who have a passion for aviation
All images Shuttleworth Trust

Finding the next generation of engineers and restorers for the historic aviation world has long been a problem, but it has become increasingly so now the country's youth isn't growing up with toys that teach you how to build things.

The Shuttleworth Collection's Head of Engineering, John Munn, knows that all too well but he is quick to note that a 'can-do' attitude can take you far in your chosen profession. He tells *FlyPast*: "One of the biggest problems facing would-be engineering apprentices is their mistaken belief that there's some kind of glass wall preventing access to this industry. There isn't. Candidates just need a willingness to learn, a can-do attitude and the desire to do a great job. Every organisation I know is looking for people; there's a general skills shortage. People think 'I'll never get to work on a Spitfire' but if you make that your goal it is achievable."

Opportunities await

The Shuttleworth Collection's apprenticeship scheme began 55 years ago, but did have an extended break along the way. John notes how, since a relaunch 16 years ago, all but one of Shuttleworth's apprentices were taken on at the end of what is now a four-year programme. Not all choose to stay for the long term, but the first apprentice to graduate from the relaunched scheme is now the Deputy Head of Engineering. Currently, the usual intake is one new apprentice every two years and new entrants are given all the practical experience required to work towards a National Vocational Qualification (NVQ). Hopefully, at the end of the four years they qualify as an apprentice. Some may progress to become licenced engineers one day if that's the career path they choose to follow.

Of course, even at an aviation treasure trove like Shuttleworth, retaining graduates can be a challenge, as John explains: "In recent years there was a lot of pressure [upon retention] from the airlines and the defence industry as they could offer salaries we could not compete with but, following Trust-wide restructure, we are now in a much better financial position and we able to pay our engineers competitively."

There's also the need to find the right kind of candidate. John continues: "Generally speaking, today's youngsters don't tend to grow up using their hands; they don't build Lego, Meccano or fix their bikes [as readily as previous generations did] so [skill wise] we find them to be about two years behind where we would have expected back in our day. The amount young people learnt from building things like Meccano just isn't there anymore, so it takes us at least a year longer to get apprentices to the stage where we would have expected [as a starting point] years ago. Nevertheless, we

are looking for people who have a demonstrable interest in working on old aircraft as we want to retain them long term, so they must have that passion.

"Perhaps they have joined the Air Training Corps, done a little gliding; something that will demonstrate their passion for aviation." Adding to the recruitment difficulty is that aviation engineering in the greater Bedfordshire area – and indeed the UK generally – has seen a decline in popularity. John notes: "The days when many local families would have worked at de Havilland or Hawker's have gone but there are some positive signs. Around a decade ago the parents or teachers of young people considering an engineering career would likely have told them there were no prospects in engineering, but today vocational jobs are considered more attractive."

Like any other apprentice scheme, joiners will have limited hand skills so will start with being shown how to perform the most elementary tasks; basic inspection techniques, how to replace a fuselage panel or spark plugs, and how to prepare an aircraft for display. As their experience builds, they will progress towards more complicated tasks such as scheduled maintenance requirements. John adds: "The engineering team not only maintains the approximately 50 Collection aircraft, but we also care for their engines and propellers, so there's a lot to learn."

He notes that any member of the team can be called upon to work on any of the aircraft at any time and even the newcomers could be working on the Collection's Bleriot one day and its Spitfire the next. So, if you are around the age of 17 and looking for a vocation that could last a lifetime why not take a closer look?

Above
Head of Engineering John Munn checks the engine oil level on a Miles Magister. Apprentices learn such routine tasks in the early weeks of their training

THE ONLY ENGINEERING OPEN WORKSHOP OF 2025

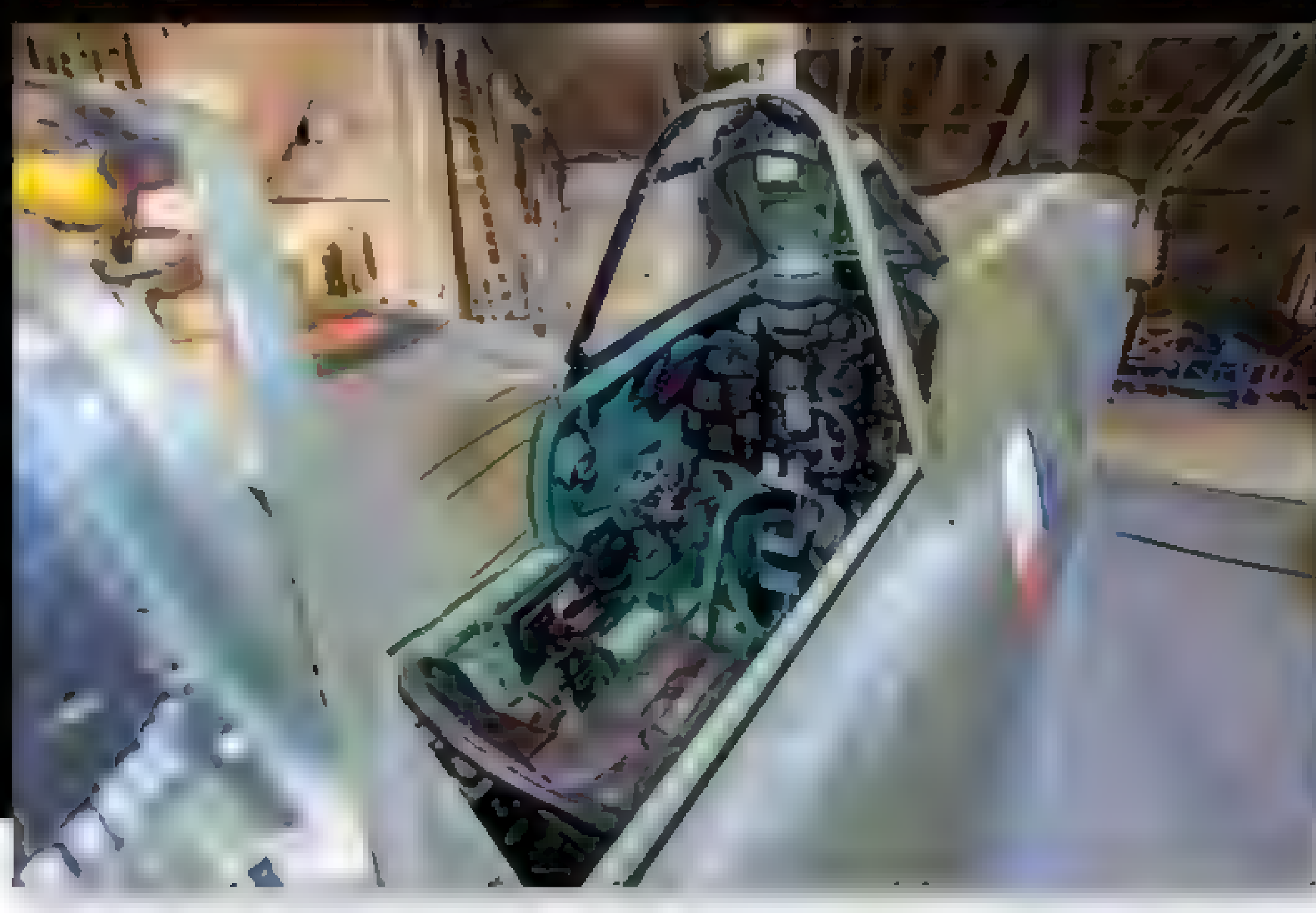
There's a rare opportunity to step behind the scenes at The Shuttleworth Collection on the horizon. If you want to quiz Shuttleworth's engineers about the apprenticeship scheme or simply enjoy seeing them restoring and maintaining the aircraft, then Shuttleworth's only Engineering Open Workshop of 2025 will take place on the weekend of February 22-23. During this special event visitors will be able to see not just the aircraft currently undergoing maintenance but the rest of the Trust's extensive collection of aircraft, working vintage vehicles and agricultural exhibits too. You will likely get the chance to take a ride in one of the Collection's fleet of vintage buses and, for a modest fee, have your photo taken in the cockpit of the Collection's Spitfire while its layout is explained to you.

Even if you regularly partake in Shuttleworth's airshows during the airshow season, having experienced one of its previous off-season Engineering Open Workshops, I can wholeheartedly recommend taking the chance to seek out this very different atmosphere. Adults £20. Members £17, free entrance for under 16s. Tom Allett

Find out more

As part of the Shuttleworth Collection's efforts to attract the younger generation its Learning Team is actively encouraging local school groups to tour the site. Some 11,000 visitors 'engaged' with the Collection by taking a ride in one of Shuttleworth's historic bus fleet last year and it is no coincidence that Shuttleworth's only Engineering Open Workshop of 2025 falls during the local half-term week. Whether you are interested in joining the apprenticeship scheme or just want to go 'behind the scenes' in the engineering hangar, it is a fantastic opportunity for all and, hopefully, Shuttleworth's sumptuous atmosphere will capture the mind of someone who goes on to have a life-long association with the Shuttleworth Trust.

Far left
While the entry age for the apprentice scheme is 17, the Shuttleworth Collection's ultimate hope is that entrants' love of working on classic aircraft will lead to a career-long commitment. This photo was taken during the 2022 Engineering Open Workshop John Robertson/The Shuttleworth Trust



Left
For a modest fee, those attending February's Engineering Open Workshop have the chance to have their picture taken inside the Collection's Spitfire while the cockpit layout is explained Darren Harbar/The Shuttleworth Trust

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Secrets of the Somme

A little-known collection of aircraft in the Somme region of northern France salutes local aviation heritage. **Tony Dixon** reports

There are a total of five Nord Noratlas transport aircraft at the museum All Tony Dixon

The town of Albert in northern France is perhaps best known for its proximity to the battlefields of the Somme during the Great War of 1914-18. For aviation enthusiasts there is another no less interesting side to the area's history. Albert is close to a large Airbus facility, and French aircraft manufacturer Henri Potez was born in nearby Méaulte.

On the town's southern side is a small museum featuring several aircraft of Potez lineage, and those of its partner, Fouga. Owner Marc Bétrancourt has amassed an eclectic collection of over 50 airframes. As well as French machines, it includes a MiG-21, Douglas DC-3, de Havilland Vampire and an F-104 Starfighter. Access is currently only on Saturdays or by prior permission given 30 days' notice – a donation of €7 was requested for my visit.

Potez/Fouga CM175 Zéphyr 24 wears French Navy colours

The nose and forward fuselage of Dassault Mercure 100 F-BTTG in Air Inter colours protrude from the first hangar

The museum also houses helicopters, gliders, fire trucks and vintage cars. Indeed, Bétrancourt's love of collecting began in the 1960s with such everyday objects as stamps and matchboxes. He acquired his first two aircraft in 1997 – initial plans to fly them were soon scuppered but with the collection increasing in size, Bétrancourt transferred his treasures to Albert. Between 2000 and 2005, large shelters were built to accommodate them, and the owner established good relationships with the French Air Force and Navy, enabling him to include other military types.

The first hangar houses Bétrancourt's large scale reproduction of a Bell X-1, a Nord Noralpha, and much more

"The Caravelle made its last commercial flight for Air France in 1981 – visitors can access this graceful looking classic airliner"

Diverse collection

Visitors are 'greeted' by the striking sight of the nose and forward fuselage of Dassault Mercure 100 F-BTTG protruding from the side of the first hangar. To the left are numerous airframes including three Nord Noratlas, two Dassault Flamants, a Potez Magister, a Lockheed T-33 and a Sud Aviation Caravelle. The latter made its last commercial flight for Air France in 1981 – visitors can access this particularly graceful looking classic airliner.

The first hangar is a veritable 'Aladdin's cave', with the only aircraft being a Nord Noralpha. The other two hangars house the rest of the aircraft. Both are 'busy' affairs, packed with aircraft and gliders, plus veteran cars, ground equipment and engines. Most are of French origin and salute the region's historic ties to the aviation industry. You can expect

Sud Aviation Caravelle III F-BHRY of Air France. The airliner has a two-class interior and made its last commercial flight for the airline in 1981

Dassault Mirage F1C 20112-ZN is among several variants of the type at the Albert museum

to find various Nord types, a number of Dassault Mirages (including a Mirage IV nuclear bomber), a Noratlas, a Dassault Ouragan, Super Mystere, and a pair of SEPECAT Jaguars, among others.

Not all have French connections – there's the aforementioned DC-3, MiG-21 and F-104, a Fiat G-91 and a former Swiss Air Force Hawker Hunter. The Hindustan-built Vampire served with the Indian Air Force. All the aircraft are cared for by enthusiastic volunteers. To quote the museum's website: "The Musée de l'Épopée de l'Aviation et de l'Industrie is a living witness to a rich industrial and aeronautical past, recounted with passion by Marc Bétrancourt, whose determination has made it possible to create this unique place in the region." www.musee-eia.com

"Bétrancourt's love of collecting began in the 1960s with such everyday objects as stamps and matchboxes"

The two hangars to the rear of the facility contain the rest of the collection. There's a huge number of interesting items in a surprisingly small space

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MAR 2025

Next month we examine Operation Gisela, the Luftwaffe's last-ditch attempt to drive RAF Bomber Command from the skies. We analyse the Hindenburg disaster – was it sabotage that downed the famed airship? And with the Avro Manchester our Classics subject, we ask why the forerunner to the Lancaster was a failure. On sale from **January 30**. See **page 23** for our subscription offers.

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